

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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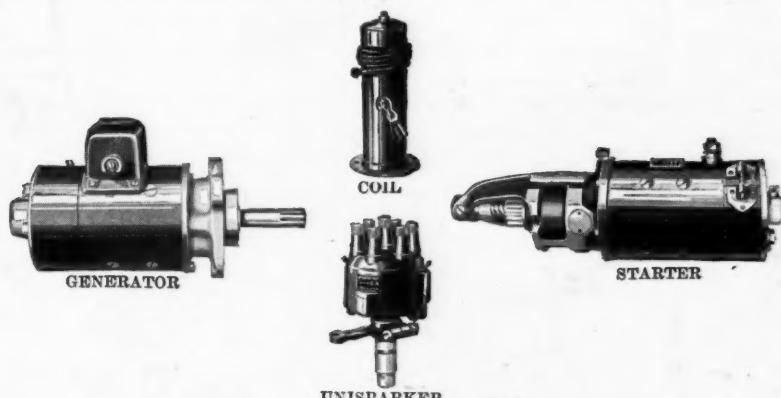
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ATWATER KENT

Ignition, Starting and Lighting

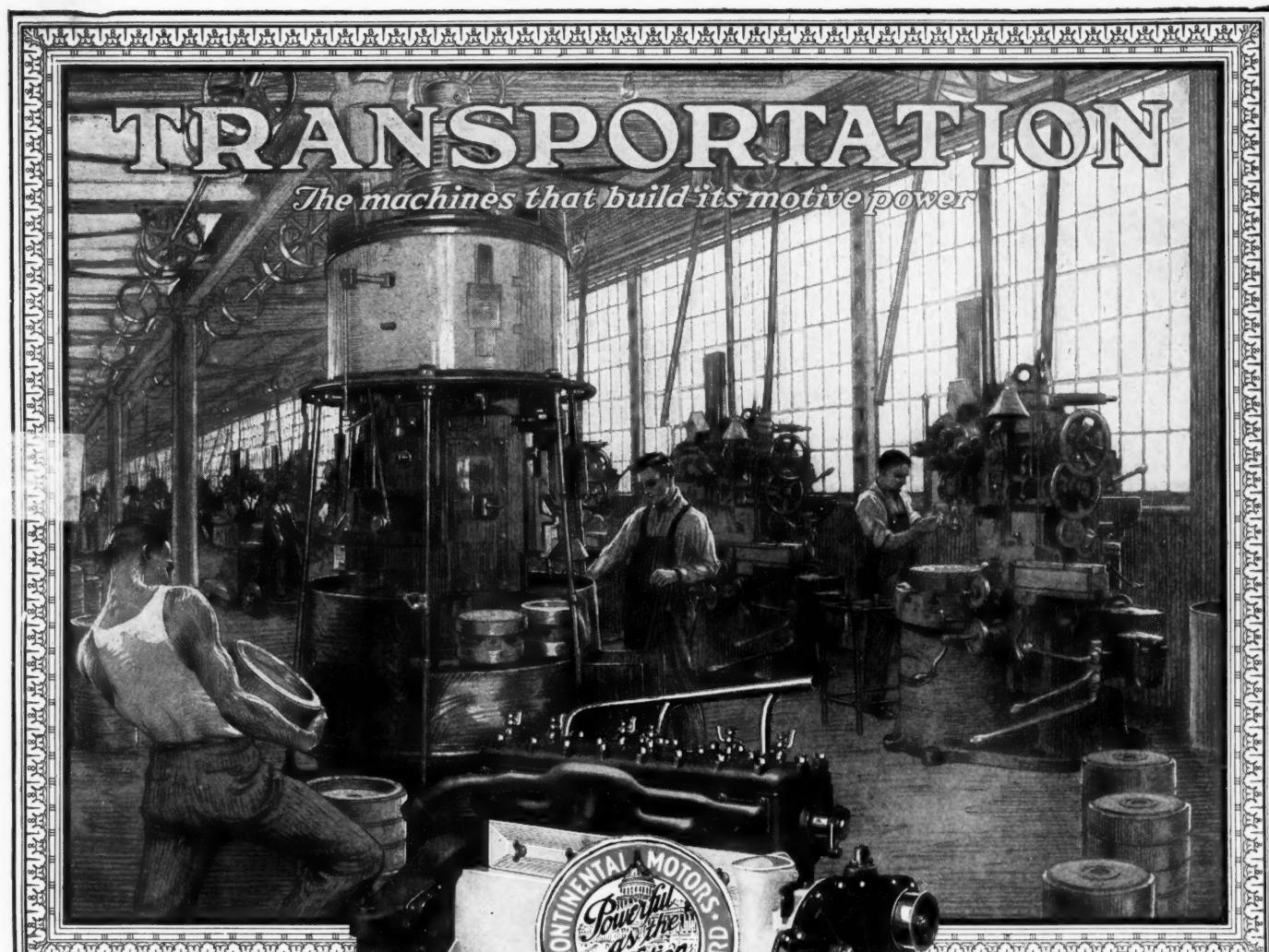
When you consider that engine performance is absolutely dependent upon the quality of spark supplied it by the ignition system, and that this spark, to be at all efficient, must be perfectly timed to the 1-1000 of a second—and that it must be constant, hot, and must not vary in intensity with engine speeds—then you realize the necessity for a system built to the highest possible standards of accuracy, precision and performance.

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STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS

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NEW YORK—THURSDAY, MARCH 3, 1921

No. 9

Plan to Center Automotive Research in S. A. E. Committee

New activity will be initiated and directed by this committee and carried forward by a research department organized as a part of Society's office staff. Important to collect and publish existing data.

By Herbert Chase

PLANS for putting into effect the research activities which it was recently announced that the Society of Automotive Engineers Research Committee had been authorized by the Council to undertake are developing and bid fair to assume the importance predicted for them. It has naturally proved impossible as yet to formulate details of the new activity, but it is understood that the work will be handled in much the same way that the S. A. E. Standard Committee work is handled. There will be an office organization with a Research Manager whose duties will include the collection of data and its preparation for publication. One of the Research Manager's duties will be to learn the view of the Research Committee, and where decisions are made to see that they are put into effect and followed through to a conclusion.

It is not proposed that the Research Committee as a whole, or such divisions thereof as shall be formed, will undertake the actual conduct of research, or finance its conduct in selected laboratories, but rather that it will arrange for such research as may be considered desirable, through co-operation with industrial laboratories as well as with laboratories of government bureaus, universities, etc.

Every effort will be made to correlate the work of various laboratories to prevent unnecessary duplica-

tion and to so arrange the work undertaken as to bring about solution of the most pressing problems of the automotive industry. The S. A. E. will thus act as a sort of clearing house for research work. It is expected also that much existing research data will be accumulated for reference and comparison, in fact, some members of the committee regard the collection and dissemination of existing data as the first and most important activity of the committee.

It is not to be expected, of course, that any one manufacturer's problems will be investigated by the committee, except in so far as such investigation will be of general benefit, but whenever the results of individual researches are made available to the committee these will in turn be made available to others in the industry who may be interested.

The committee as at present constituted is as follows: Henry M. Crane, Chairman. Harry L. Horning, E. A. Johnston, C. F. Kettering, J. G. Vincent, Herbert W. Alden, Dr. H. C. Dickinson, T. C. Menges, Joseph Van Blerck and Prof. O. C. Berry.

This committee will be added to from time to time as need requires and will no doubt be segregated into divisions, as is the case with the Standards Committee, should this prove desirable.

There are quite natural differences in viewpoint among members of the committee as to ways in

which the work to be undertaken can be made most useful, as to how it can best be carried forward and as to what subjects are of greatest importance. It is quite generally agreed, however, that research pertaining to fuel and its utilization is of paramount and most general importance.

One member of the committee takes the view that research gathered by the committee should be confined to very definite commercial ends—to the solution of problems of immediate and pressing importance to the industry. But the same member fully recognizes the need for digesting and publishing information now available. He indicated that some large industrial laboratories have already expressed willingness to co-operate with the committee, not only in making available information now in hand or in progress of collection, but by prosecuting for the general good of the industry lines of research laid down by the committee.

In some instances, more especially in the case of university students research where the investigators are frequently lacking in experience, it will doubtless prove desirable to have the same line of work undertaken in two or more laboratories in order that a check may be had.

One member of the committee is drafting for discussion a set of rules of procedure to govern activities of the committee. When patents are involved it will, of course, be necessary to proceed with caution in order not to favor any commercial interest. This matter will require careful handling.

It has been pointed out, quite properly, that a close relationship necessarily exists between standardization and research work. It is frequently necessary to carry through certain research work before a satisfactory standard can be formulated.

Coker F. Clarkson, General Manager of the S. A. E., believes that the decision to undertake the work with which the Research Committee is charged is of as great significance and importance to the Society as was the decision, arrived at many years ago, to undertake standardization work. The latter work required the establishment of a standards department in the S. A. E. staff and it is expected that a similar department will be built up to handle the detail prosecution of the research program. The Research Committee will formulate policies and lay out the program of work to be undertaken, but will necessarily have to depend largely upon the Research Department to carry the work forward. It has been agreed that the Society shall, at least for the first year, undertake work on its own resources, that is without seeking outside funds for the purpose. It seems quite likely, however, that as the work progresses and becomes of greater value to the automotive industry as a whole, the industry will participate in supporting it financially as it has the standardization work of the Society.

Some members of the committee feel that the automotive industry in common with most other industries, lacks appreciation of the value and importance of research fundamentals, and would confine the work of the committee to the determination of facts without attempting to apply the results of research to automotive products. The same persons lay stress upon the educational value of the work, believing that a better knowledge of fundamentals will result in more intelligent application of these fundamentals to the solution of the problems of the industry. If the committee can succeed in demonstrating to all concerned the need of more careful and thoroughgoing research, its hope that the quality of work turned out, especially by industrial laboratories, will reach a higher standard will no doubt be realized.

If various industrial laboratories agree, as is expected, to exchange information through the offices of the committee, it is evident that much duplication will be avoided, and a great deal gained both in time and cash outlay. Even if the committee succeeds in the first year in simply persuading industrial organizations of the advantages to all concerned of releasing data accumulated as a result of research conducted by these organizations its efforts will be well spent. In many cases standards of comparison are lacking, so that results obtained in various laboratories are not comparable. Efforts to bring about the general acceptance of such standards will enable ready comparisons to the benefit of all concerned, hence there is opportunity for fruitful results in work to this end.

There are in this country some eighty engineering schools in which courses in automotive engineering are being given. Most of these have laboratory facilities which can be or already are engaged in automotive research work. There has, however, been little if any effort to organize or correlate this work in such manner as to make it of greatest value either to the industry, which, in many instances, is called upon to donate the engine or other apparatus to be tested, or to the institution whose facilities and personnel are used.

Some universities regarded as leaders in automotive engineering education have already indicated a desire to arrange their programs of research in such manner as to avoid unnecessary duplication and to make their work of the utmost possible value to the automotive industry. They have, in fact, expressed willingness to co-operate in bringing about arrangements whereby a program in which each institution will have a definite pre-arranged part will be formulated and carried out in conjunction with the committee.

It is believed that the Research Committee of the Society can and will play an important part in formulating such a program and in seeing that it is carried through and the results compiled in a form that will make them of greatest value to all concerned. It has long been apparent that some organization can and should perform this function, and it seems certain that no organization can do it to better advantage than a properly constituted committee of the Society.

Those who are familiar with the work of the S. A. E. during the past few years will recall that the Council of the Society has appointed research committees which served during several recent administrations, and that a report on fuel utilization in present day engines was made at the last summer meeting of the Society by one of these committees. Aside from this little has come from the activities (or lack of activity) of these committees. This has been due in part to the fact that the Society office staff did not include personnel sufficient to carry forward on an effective scale work which could otherwise have been prosecuted. This personnel is now to be added to the staff of the Society, and the results which have long been considered possible of attainment should now be realized. The appropriation of \$30,000 by the Council to be used in defraying the cost of maintaining the necessary organization, constitutes in the opinion of many members of the Society one of the most important actions ever taken by the Society. The ultimate good which results will naturally depend in large part upon the research organization built up as well as upon the support and co-operation of Society members and others in the work. If this co-operation is forthcoming as now seems likely, there appears to be little question but that the new activity will give much deserved credit to the Society and those responsible for instituting and prosecuting the research program.

Progress in Highway Educational Problems

President Burton of Michigan University believes that present generation will see highway development equal to railroad development witnessed by older generation and that education in this line is the great need of today. Other prominent speakers at Michigan Highway Conference.

By Clyde Jennings

THE movement for a wider appreciation of education in highways and highway transport gained a long step forward when Dr. Marion L. Burton, president of the University of Michigan, addressing a gathering of highway commissioners and engineers and students of the University, said in effect:

We want it known that the University of Michigan appreciates the importance of the highway movement. I am not exactly certain in my statistics, but I expect to see between twenty and twenty-five billion dollars expended in highway construction during the next generation. It is my expectation that the generation now coming into manhood will see in its active life a movement in highway construction that will equal the development in railways that the older generation has witnessed. It is my belief that education in this line is one of the great problems of today and we hope that each student of this university shall leave here with an appreciation of this problem.

This statement, coming from the president of a leading western university, cannot but have a marked influence in educational standards. The University of Michigan has been one of the leaders in highway engineering and has been quick to appreciate the need of the complementary education—that in highway transport. Several other western universities have been and are working along the same line, but the eastern universities, in the main, have ignored the topics.

The occasion of this strong statement from Dr. Burton was a mass meeting which was a part of the Seventh Annual Conference on Highway Engineering and Highway Transport at the University of Michigan. Those in attendance at the five-day session were highway leaders of Michigan. On February 23 the members of the Permanent Committee on Highway and Highway Transport Education were guests of the University and of the Conference. The sessions of that day were under direction of Dr. P. P. Claxton, United States Commissioner of Education, and chairman of the committee. During the day the members of this committee explained to the members of the Michigan Conference the objects of their work. It was the second meeting of this sort the committee has held, the previous one being at Pittsburgh last November, when a similar exposition of the work was made to the school teachers of Pennsylvania. It is interesting to know that the meeting out of which this committee was developed was held at Ann Arbor last April.

The explanation of the work of this committee is simple. It is the thought of those responsible for the committee that there is a great need of engineers for the proper de-

velopment of the highway plans now financed. Also when these highways are developed there will be a need of engineers to properly direct the traffic over them. This committee is encouraging proper schools to enter this field of education.

A highly interesting message of this session was contained in a paper read of Thomas H. MacDonald, chief of the United States Bureau of Roads, who said in effect that a highway in itself is of no value. It lacks the merit of a work of art, or of an article of certain intrinsic value. Its value is entirely in the service it renders to the community. On this theory he maintained that it is the duty of the promoters and builders of highways to measure their building by the traffic needs of the community which the highway is to serve.

The Committee was welcomed to the University of Michigan by Dean Cooley of the College of Engineering. The program included an address on "Highway Social and Economic Welfare," by Dr. Claxton, who insists that the educational and social advantages of highways will well repay their cost. Prof. C. J. Tilden, director of the Permanent Committee, explained the objects of the committee. Roy D. Chapin pictured the future of highway transport. George C. Diehl, Chairman of the Good Roads Board of the American Automobile Association, outlined a course in local geography for secondary schools which, he said, would be a great move toward a better understanding of the highway situation by the citizens of tomorrow. Harriet E. Beard, of the Detroit schools, told of the effective safety work being done there. Col. Mason H. Patrick told of the interest of the army in roads. Prof. Henry E. Riggs compared highways with railroads. Arthur H. Blanchard, professor of highway engineering in the U. of M., outlined effective surveys for highway transport. There was a largely attended dinner in the evening at which Dean Cooley presided and Tom Snyder and A. R. Kroh were speakers.

A SERIES of experiments, begun in 1914, but interrupted by the war, has recently been resumed in Brussels on the use of palm oil in internal-combustion motors. A Swedish two-cycle semi-Diesel engine was found which would run successfully on palm oil. According to analysis by Belgian chemists, palm oil is a mixture of palmitate and oleate of glycerine, with some variable quantities of palmitic and oleic acid. It contains about 95 per cent. of fatty acids and appears as a pasty substance of yellowish or salmon color. Its calorific power is estimated at 9,228 calories (Barthelot-Mahler), and it is inflammable at 210° C.

Two New Worm Gear Axles Arranged For Hotchkiss Drive

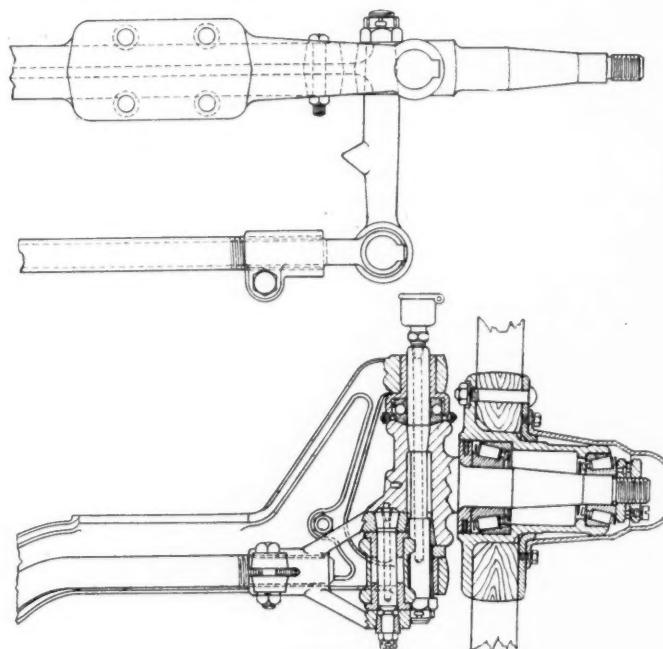
Housing and spiders are steel castings. Axle shaft, brake cams and some other important parts are of molybdenum steel. Both brakes internal expanding. Special lubricating features on both front and rear types.

By J. Edward Schipper

TWO new worm-drive axles incorporating a number of ingenious features, were shown at the Chicago show. They are the product of the Dunkirk Axle Co. The heavier of the two models are known as R-20 for the rear and F-20 for the front. They are similar in most respects to the smaller models R and F-15. The housing, housing spiders and hubs are made from electric steel castings. The worm and worm wheel are of generous proportions. Reduction ratios of 5.2, 6.25 and 7.75 are standard for model R-20.

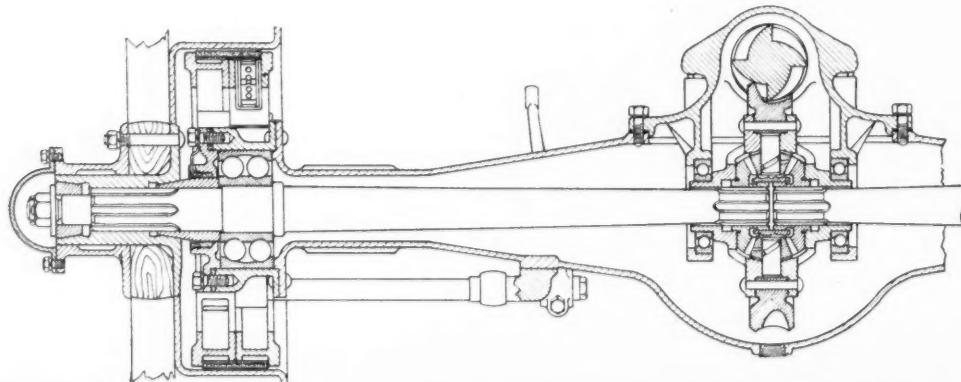
The differentials are of the bevel type and the side gears are splined to receive the ends of the axle shaft. The pinion, spider and side gears are all made from alloy steel, hardened and ground, for the bearings and splined fits. No bushings are used. The axle shaft, brake cams, brake supports and other important parts subject to stress are made from electric furnace, chrome molybdenum steel, heat treated and ground to size. Concentricity of the drum is secured by grinding on the inside braking surface and at the same time, grinding the center hole to size. The brakes are dual, internal expanding, of the wrap-up type. Each brake has an expanding and centering member, the lining and brake bands being separate pieces. With this

feature it is possible to remove the brake lining rapidly for relining purposes without the use of wrenches, tools, etc., and also without the necessity for removing the entire brake shoe.

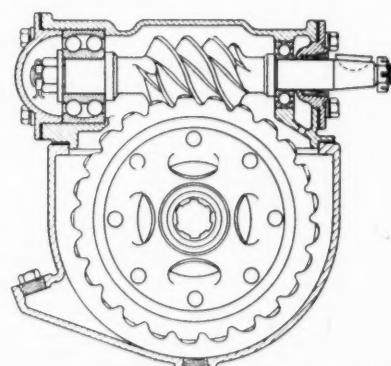


The Dunkirk model F-20 front axle for trucks

feature of the axle is the oil retaining packing which allows the entire wheel mounting to run in an oil bath without leakage to the drum. Dunkirk axles are produced in the plant formerly used by the Empire Axle Co. Production is scheduled to start at the rate of 500 sets a month.



Longitudinal and transverse sections of Model R-20 Dunkirk worm-drive truck axle



Worm gear assembly

Worm gear assembly

Rigid Construction and Clean Appearance Features of New Engine

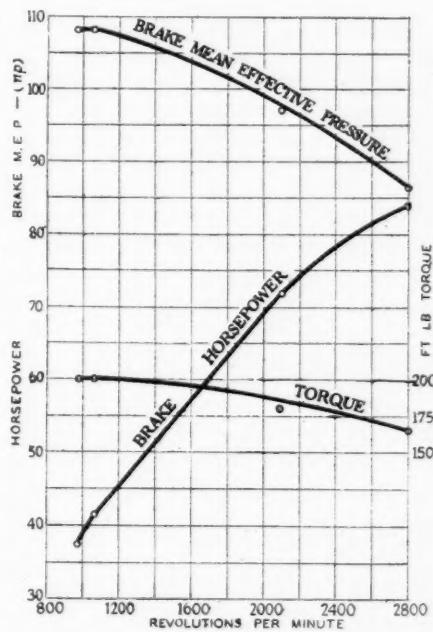
High power output and good fuel economy claimed for engine recently tested in Detroit. Positive lubrication, overhead valves and camshaft, complete enclosure of moving parts, five bearing disk type crankshaft and easily detached accessories are among other interesting features.

By J. Edward Schipper

AN interesting four-cylinder engine designed by Frank S. Spring and H. L. Elfes, has been under test for the past 2 yr., both on the dynamometer and in a car. Some rather remarkable results are claimed.

The power output from four cylinders of $3\frac{1}{2}$ in. bore by $6\frac{3}{4}$ in. stroke with a displacement of 278 cu. in. is shown in the accompanying curve. It will be noted that the engine develops 85 B.H.P. at 2800 r.p.m. It weighs 400 lb., including accessories and clutch. The entire powerplant is 33 in. in length. The crankcase is very stiff and heavily ribbed. It supports a 5 bearing crankshaft of the disk type, $2\frac{1}{4}$ in. in diameter. The design permits the construction of a short engine, and is said to account to some extent for its lack of vibration.

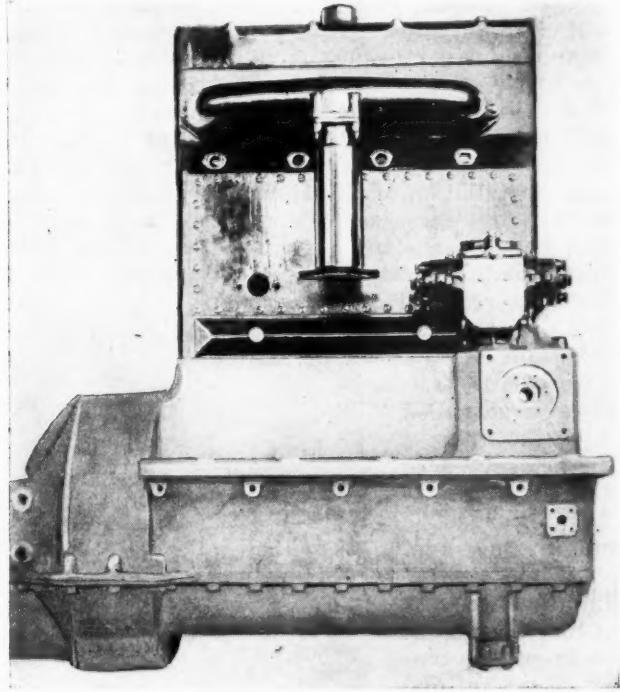
Tests of the engine mounted in a chassis were recently concluded by a large motor car builder in Detroit. The car carried five passengers and weighed 4300 lb. It was driven approximately 400 miles over roads in the vicinity of Detroit, averaging, it is claimed, 24 mi. per gal. In a later run of 1200 miles, with a load several hundred pounds greater than in the test mentioned the designer claims the car averaged 18 m.p.g. The route included the test hills in



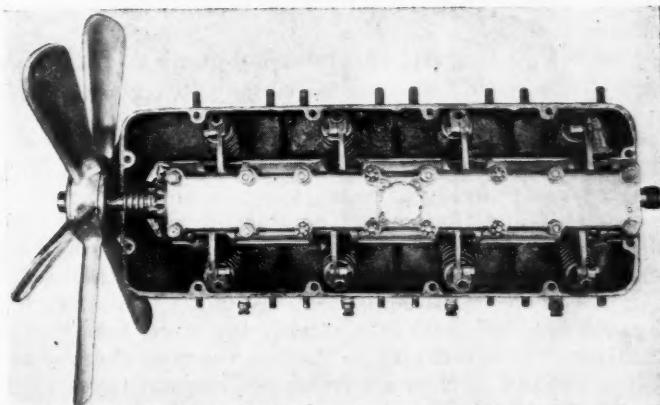
Performance curve of Spring engine

which is carried on the forward end of the overhead camshaft.

The oil pump is formed by meshing the gear on the lower end of the vertical shaft, which drives the overhead camshaft with the top gear of the short stub shaft driven by the crankshaft. This construction cushions the camshaft drive and helps to silence the valve mechanism. The



Intake side of Spring engine showing clean external appearance



Top view of Spring engine with valve cover removed

the vicinity of Pittsburgh and the car was driven wide open whenever conditions permitted.

All bearings are of generous proportions and it is said that their life is more than doubled by the use of the dry sump, in conjunction with high-pressure lubrication delivering a very large volume of cool oil, properly filtered, to all working parts. The latter are completely enclosed, in fact the only exposed moving part is the fan,

stub and vertical shafts are hollow. Oil is lead, through the vertical shaft, to the hollow camshaft and to the tubes upon which the rocker arms are located, oiling all bearings, and returning to the sump through passages cast in the cylinders and crankcase. Oil is led from the stub shaft through suitable passages to all of the main bearings, and thence through holes drilled in the crankshaft to the connecting rod bearings.

The cylinder walls and piston pins are lubricated by the oil thrown off from the connecting rods. A scavenging-pump is located externally on the front end of the oil pan. This pump returns the oil from the sump to the oil tank, which is separate from the engine, as fast as it accumulates.

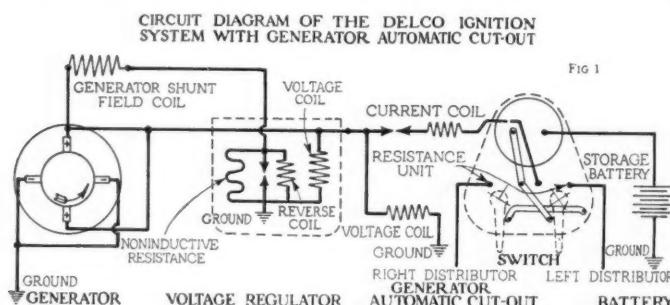
Baffle plates are cast integrally with the upper case to prevent excessive lubrication of the cylinder walls. It is claimed that under the most extreme running conditions, the temperature of the oil in the tank has never exceeded 100 deg. Fahr. Carrying the oil in a tank separate from engine has the advantage that it allows the use of an efficient filter of large area, that is easy to get at and clean.

The removal of the top cover of the motor exposes the rocker arms and tappets for inspection and adjustment. The manifolds are external, and are easily removable; in fact, any of the units such as the distributor, generator, pump and starter can be removed by unscrewing not more than four nuts and without disturbing other units.

A Generator Cut-Out for Aircraft Use

A CUT-OUT, designed to be incorporated in the Delco airplane engine ignition system, has been on test at the laboratory of the War Department, Air Service, at McCook Field. The purpose of the cut-out is to break the circuit between the generator and the battery whenever the direction of current flow is reversed, i.e., when current starts to flow from battery through generator. This condition occurs in the Delco system at all generator speeds below approximately 1000 r.p.m., at which speed the generator ceases to charge. Since the battery and the generator are always in circuit in the Delco system except when the switches are shut off, a considerable drain on the battery results from the discharge of current through the non-functioning generator.

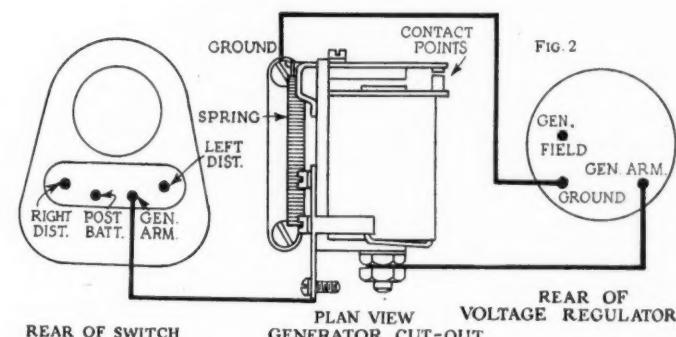
In the standard Delco system, the generator can be cut out at low engine speeds by shutting off one of the two switches in the low tension leads to the two distributor heads. This saves the battery, the capacity of which is limited, but necessitates operation of the engine on only one set of spark plugs at a time when, to prevent fouling, both sets of plugs should be firing. Cutting



out the generator, when it is not charging, by means of the device tested, makes it possible to operate on both sets of spark plugs without unnecessarily draining the battery.

The Delco automatic generator cut-out, Fig. 1, consists of a voltage coil of fine wire, one end of which is grounded, and a current coil of heavier wire, both wound around an iron core. An armature with contact points is provided so that, with sufficient current flow from the generator through the voltage coil, this core will be magnetized and the contact points will close, thus completing the circuit between the generator and the battery. After the closing of the contact points the operation of the electrical equipment is exactly similar to the present type of installation with the exception that a small amount of current is flowing through the voltage coil to ground. When a reversal of current takes place due to stoppage, slow running, or a short circuit of the generator, a reversal of the magnetic flux around the current coil occurs and demagnetizes the iron core. The

WIRING DIAGRAM OF DELCO AUTOMATIC GENERATOR CUT-OUT



armature is drawn back by the spring and the contact points are separated, opening the circuit from the battery.

The clearance between the contact points should be about 0.018 in. The voltage required for the closing of the contact points is regulated by the tension of a spring (shown in the wiring diagram, Fig. 2). The tension of this spring should be such as to allow the contact points to close at a potential of eight volts.

If the contact points of the voltage regulator separate before the contact points of the automatic generator cut-out close, then the cut-out points never will close, as the regulator will prevent the voltage building up sufficiently to get enough magnetization of the cut-out core to close the contact points. In other words, the generator will not be put into the circuit at any engine speed if the voltage regulator operates before the cut-out closes.

In the installation of the automatic cut-out in an airplane, it is first necessary to disconnect the present connection between the armature terminal of the switch, and the armature terminal of the voltage regulator. The wiring then required is shown by the wiring diagram, Fig. 2. The cut-out is fastened to any convenient point on the fuselage by the bracket shown in Fig. 3.

The automatic generator cut-out switches the generator into the circuit at about 500 r.p.m., at which speed the ammeter shows a discharge of about 3 amp.

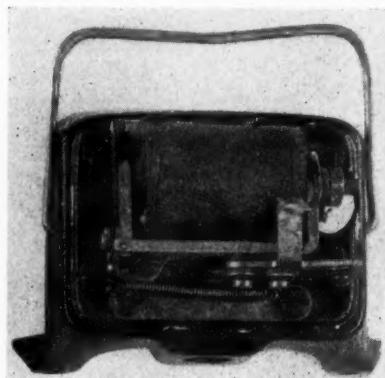


Fig. 3—Assembly view automatic generator cut-out

Passenger Cars Compared on Displacement Per Ton-Foot Basis

Wide variation in practice is shown to exist. Some makers allow nearly double the displacement per ton-foot allowed by others, thus enabling good acceleration and hill climbing ability at a sacrifice in fuel economy.

By P. M. Heldt

ONE of the fundamental factors in passenger car design is the piston displacement on high gear per unit of weight moved a unit distance. This can conveniently be expressed as the cu. in. of piston displacement per ton per foot of travel. In calculating the piston displacement, account is taken only of the displacement during the working stroke and in calculating the ton-feet, both the weight of the car ready for the road and the weight of the passenger load must be considered.

Let W be the weight of the car with load in pounds; d , the wheel diameter in inches; D , the piston displacement of the engine in cubic inches, and r the gear ratio on high gear. Then in one revolution of the rear wheels the car moves ahead

$$\frac{3.1416 \times d}{12} = \frac{d}{3.82} \text{ ft.}$$

The weight of the car and load is

$$\frac{W}{2000} \text{ tons,}$$

hence

$$\frac{W}{2000} \times \frac{d}{3.825} = \frac{Wd}{7650} \text{ ton-ft.}$$

While the rear wheels make one turn the engine crank-shaft makes r turns, and the total displacement of the pistons during these r turns is $2rD$, but as only every fourth stroke is a power stroke the useful displacement is $rD/2$. Hence, dividing the displacement by the ton-feet we get

$$\frac{\frac{rD}{2}}{Wd} = \frac{3825rD}{Wd}$$

In order to compare the practice followed by various manufacturers in this regard we have collected data on practically all American built passenger cars and tabulated it for convenient reference. To the weight of the car with full supplies ready for the road we have added 150 lb. for each passenger for whom seating capacity is

Name of Car	Cu. In. Displacement per Ton Foot	Piston Displacement Cu. In.	Road Weight with Pass., Lb. (on High)	Gear Ratio	Wheel Dia. In.	No. of Pass.	Name of Car	Cu. In. Displacement per Ton Foot	Piston Displacement Cu. In.	Road Weight with Pass., Lb. (on High)	Gear Ratio	Wheel Dia. In.	No. of Pass.
Monroe	24.6	298.2	4670	3.22	32	4	Dodge Bros.	32.5	212.3	3250	4.16	32	5
Monroe	24.7	294.3	3250	4.50	32	5	Standard	32.6	331.8	4960	4.25	35	7
Norwalk	25.1	192.4	4160	4.50	32	5	Winton	32.7	347.9	5196	4.90	35	7
Friend Four.	25.8	149.3	3180	4.60	32	5	Lorraine	32.8	192.4	3250	4.63	32	5
Reo	26.0	192.4	3490	4.25	32	5	Westcott	32.8	224.0	3960	5.00	33	5
Reo	28.0	239.4	3950	3.87	32	5	Apperson	33.2	331.8	4760	4.25	34	7
Stephens	28.2	224.0	4525	4.90	33	7	Auburn	33.2	224.0	3705	4.75	33	5
Seneca	28.5	138.1	2930	4.75	30	5	Hudson	33.2	288.6	4796	4.90	34	7
Oakland	28.5	177.0	3340	4.50	32	5	Holmes	33.3	245.3	4060	4.90	34	7
Liberty	28.5	230.1	3680	..	32	5	Moon	33.3	424.1	6070	4.36	35	7
Dorris	28.6	377.0	5106	3.35	33	7	Jordan	33.4	241.0	3760	4.50	33	5
Tulsa	28.8	192.4	3487	4.50	33	5	Ferriss	33.6	224.0	3725	4.66	32	5
Lexington	28.8	224.0	4300	4.62	32	7	Mitchell	33.9	303.1	4400	4.08	32	6
Essex	28.9	178.9	3448	4.66	32	5	Maibohm	34.0	248.9	3750	4.41	33	5
Cadillac	29.0	314.4	5170	4.43	35	7	Nash	34.0	195.6	3100	4.50	32	5
Saxon	29.0	178.9	3500	4.75	32	5	Haynes	34.3	248.9	3818	4.50	33	5
Cleveland	29.2	190.8	3475	4.45	32	5	Piedmont	34.4	288.6	4500	4.77	34	5
Briscoe	29.6	178.9	3115	4.18	31	5	6-40	34.5	524.8	6445	3.87	35	7
Templar	29.6	196.8	3475	4.40	32	4	Ford	34.6	224.0	3500	4.50	32	5
Commonw'lth.	29.7	192.4	3190	4.25	33	5	Pilot	34.8	176.7	2360	3.63	30	5
Harroun	29.7	174.2	2990	4.00	30	5	Sayers Six.	34.8	248.9	3850	4.50	32	5
Kline Kar.	29.8	224.0	3600	4.56	33	5	Leach	34.9	224.0	3550	4.75	33	5
Marmont	29.9	339.7	4940	3.75	33	7	Case	35.2	303.1	2675	4.50	32	5
Nelson	30.2	145.7	2800	4.25	32	4	Paige G.	35.2	248.9	4710	4.87	34	7
National	30.2	303.1	4905	4.08	32	7	Cunningham	35.5	441.7	3890	4.75	33	5
Daniels	30.3	404.1	5250	3.50	34	6	Metz, Master 6	35.5	5550	4470	4.08	35	7
Skeilton	30.7	192.4	3185	4.25	32	5	Lincoln	36.0	230.1	3635	4.67	32	5
.....	30.7	230.1	3700	4.25	33	5	Paige L.	36.4	357.8	5124	4.45	33	5
Noma	30.9	224.0	3850	4.25	32	5	King	36.6	331.4	4801	4.55	33	7
Buick	30.9	241.6	2700	4.08	33	5	Peerless	36.7	282.7	4500	4.87	32	7
Overland	31.0	143.1	2650	4.50	30	5	Elgin	36.9	331.8	4990	4.90	34	7
Rock Falls.	31.2	331.4	5660	4.87	35	8	Chandler	37.0	218.6	3500	5.10	33	5
Hatfield	31.2	192.4	3420	4.63	32	5	Cole	37.0	288.6	4105	4.40	32	7
Hupmobile	31.3	182.5	3390	4.87	32	5	LaFayette	37.2	346.3	4830	4.45	33	5
Dixie Flyer	31.4	192.4	3400	4.72	32	5	Meteor	37.5	348.4	4890	4.50	33	5
Allen	31.5	192.4	3375	4.63	32	5	McFarlan	38.1	420.4	4250	3.92	32	4
Patterson	31.6	224.0	3690	4.50	33	5	Stevens-Dury	38.8	572.5	6100	3.50	33	7
Scripps-Booth	31.7	177.01	3250	4.87	32	5	Crawford	38.9	510.4	5650	3.94	35	7
American	31.8	248.9	4210	4.50	32	5	Brewster	39.4	313.1	4150	4.45	32	5
Roamer	31.9	303.1	4400	3.87	32	5	Bour Davis	40.4	376.5	4850	4.25	32	5
Elcar	32.0	324.0	3660	4.50	33	5	Davis	41.7	303.1	3910	4.50	33	5
Oldsmobile	32.0	224.3	3900	4.66	32	5	Franklin	42.4	224.0	3680	5.90	33	5
Porter	32.0	478.4	5310	3.25	35	7	Severin	43.6	303.1	3195	4.33	32	5
Grant Six	32.1	198.9	3450	4.66	32	5	Piedmont 4-30	47.0	192.4	3735	4.50	32	5
Globe Four.	32.2	178.9	3250	4.90	33	5				2200	4.50	32	5
Gardner	32.4	192.4	3130	4.41	32	5							
	32.4	414.7	5920	4.28	35	7							

provided. From this total weight, together with the piston displacement, the gear ratio and the wheel size, the displacement per ton-foot was computed.

For more than one-half of all the cars this figure lies between 30 and 35, and the average of all the values is 32.8. A car having a high displacement per ton-ft., all other things being equal, would be able to ascend comparatively steep grades on high gear and would be capable of a high rate of acceleration, but it would consume more fuel per ton-mile than a car in which the displacement per ton-foot was smaller.

On a smooth, level road the resistance to vehicular motion at low speed is about 50 lb. per ton, this including frictional losses in the axle and those in the transmission due to the churning of the lubricant, etc. Therefore, while the vehicle moves one foot the work done in overcoming traction resistance is 50 ft. lb. per ton. The brake mean effective pressure of a gasoline engine under full throttle is about 75 lb. per sq. in. and the work of one cu. in. displacement therefore is

$$\frac{75}{12} = 6.25 \text{ ft. lb.}$$

There is, of course, a slight additional loss in the gear-set and the rear axle when these are transmitting load, and, allowing for this loss, we may say that when the engine runs under full throttle, about 5.5 ft. lb. of work is done in propelling the vehicle for each cubic inch piston displacement under gas pressure. As 50 ft-lb. are required per ton-foot of transportation it would require a minimum of

$$\frac{50}{5.5} = 9.1 \text{ cu. in.}$$

piston displacement per ton-foot to propel a car at low speed on a hard, smooth, level surface. What we actually provide is 32.8 cu. in. displacement, from which it follows that the pressure on the piston in regular operation is only about

$$\frac{9.1 \times 100}{32.8} = 27.7 \text{ per cent}$$

of the maximum. The speed of the engine will be less than one-half that at which it gives its maximum output, and as power depends on both pressure and speed, the power developed by the engine when driving at 15 m.p.h., say, is not much more than 10 per cent of the maximum power.

Comparison With Small European Car

It is of interest to compare with the above figure of 32.8 cu. in. per ton-ft., the corresponding figure for a Fiat Model 501, a car evidently designed for economical use of fuel. One of these cars took part in an Australian fuel economy contest, and won first prize in the members' event for cars of 15 hp. or less. This car did a distance of 31.344 miles to the gallon and 36.438 ton miles per gallon, hence it weighed with load 2325 lb. It has a four-cylinder engine of 65 x 110 cu. in. bore and stroke, a gear ratio of 5.1 to 1 and 760 x 90 cu. in. wheels, making the wheel diameter practically 30 in. The piston displacement figures out to 89 cu. in. Hence the cu. in. displacement per ton-ft. is

$$\frac{3825 \times 5.1 \times 89}{2325 \times 30} = 24.9.$$

This is 24 per cent less displacement per ton-foot than that of the average American car.

Nickel Plating Aluminum

WE have received several inquiries regarding the subject of nickel plating aluminum. The following item in this connection should therefore prove of interest.

—THE EDITOR.

A. Mazuir describes a process of nickel plating which has given him the best of results as regards both adherence of the layer formed and fineness of the deposited metal. This process consists of the following four operations: Decrustation, cleaning of the surface to be nickelized, immersion in a bath of a metallic chloride, nickelizing at a high-current density.

The piece of aluminum is lowered for a period of two minutes, while cold, in a bath containing 8 grams of NaO and 30 grams of cyanide of potassium per liter. With this concentration the aluminum is not appreciably attacked; in fact, the effect on the metal is so slight that even threaded and calibrated parts can be handled. The piece is washed in an excess of water and is then energetically brushed with a solution containing 4 parts of water to one part of lime. The surface in this way acquires a brilliantly white appearance without streaks or spots.

The piece is washed and brushed once more to get rid of all traces of lime and is then immersed in an acid bath of some metallic chloride. It has been found that chlorides of manganese and of iron give better results than any other chlorides. Thus with a bath of the following composition—

Hydrochloric acid of 22 deg.	350 cu. cm.
Manganese	2 grams
Water	650 cu. cm.

there was obtained a coating of nickel without spots and very adherent. With a bath of iron chloride containing 3 grams of iron per liter, the results are slightly less satisfactory; the deposit is then a dull white.

During the immersion there is formed on the surface of the piece a metallic coat resulting from a chemical transposition between the iron and the aluminum; fine particles of iron become fixed on the aluminum and thus form an intermediate, very tenacious layer between the aluminum and the nickel.

The immersion in this acid bath lasts two or three minutes. The piece is washed in a low-pressure stream and is then placed in the nickelizing bath proper. A bath of the following composition was used:

Simple sulphate of nickel	120 grams
Double sulphate of nickel	50 grams

This bath must show 12 to 13 deg. Baume, and must be completely neutral. The anodes consist of laminated nickel plates. The pressure should vary between 2.5 and 3 volts. In going beyond these limits there is obtained a deposit which does not adhere and which flakes off. The current density should vary between 1 and 1.5 amperes per square decimeter.

The piece is left in the bath for an hour and a half, if it is of average size. It is then washed in boiling water and dried by compressed air. The layer of nickel obtained by this process has a remarkable adherence and an incomparable whiteness and polish. Sheets of aluminum thus nickelized resist the most energetic torsion without peeling off.—*La Technique Moderne*.

Parts and Accessories at the National Tractor Show

Recent developments in air cleaners, traction devices for wheeled tractors and automatic hitches. Rubber tired wheels for road work, line control mechanisms for Fordson tractors and a drawbar pull indicator.

By P. M. Heldt

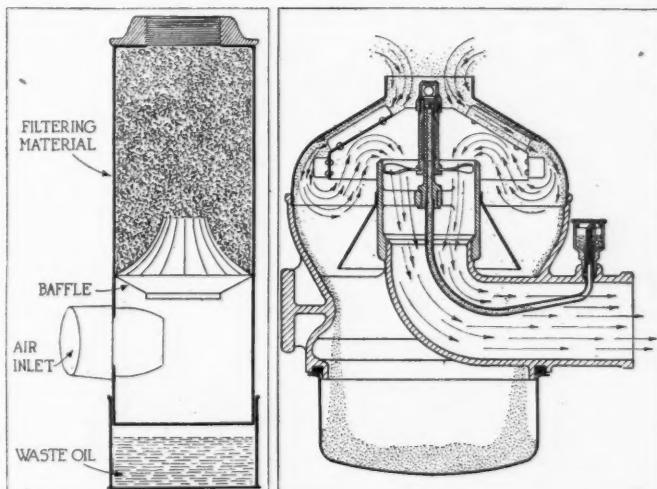
MOST of the stands around the walls at the tractor show were devoted to parts and accessories, and there was among these exhibits at least as large a percentage of novelties as among the tractors themselves. There were evidences that the heavy fuel problem, the air cleaner problem, the driving lug and other problems of the tractor industry had received due attention during the past year. There were also the usual number of devices intended to improve the Fordson tractor or adapt it to particular uses.

The Climax Engineering Co. exhibited engines with a new type of manifold, known as the K-317 manifold. This is a combined inlet and exhaust manifold in which provisions are made for regulating the amount of heat imparted by the exhaust gases to the incoming fresh charge. Referring to the sketch herewith, the inlet and exhaust manifold are in a single casting, and there is a hot spot or exhaust-heated portion of the inlet passage at the center. There are two outlets from the exhaust manifold, one being through this exhaust jacket and the other from the ends of the straight, horizontal portion of the manifold, through a cast pipe connecting with the outlet from the exhaust jacket at the center. There are damper type valves at the joint of the exhaust manifold with the return pipe, both on the same shaft, which are controlled by means of a pinion and sector mechanism. By closing these damper valves, all of the exhaust gases can be passed through the exhaust jacket, whereas by opening them more or less, almost any desired fraction can be shunted around the jacket.

New Air Cleaners

Two new air cleaners were shown, the Pomona Vortox and one manufactured by the United Manufacturing and Distributing Co. The first, illustrated in section herewith, is of the combined centrifugal and filtering type. The air enters through a tangential inlet and is thus given a

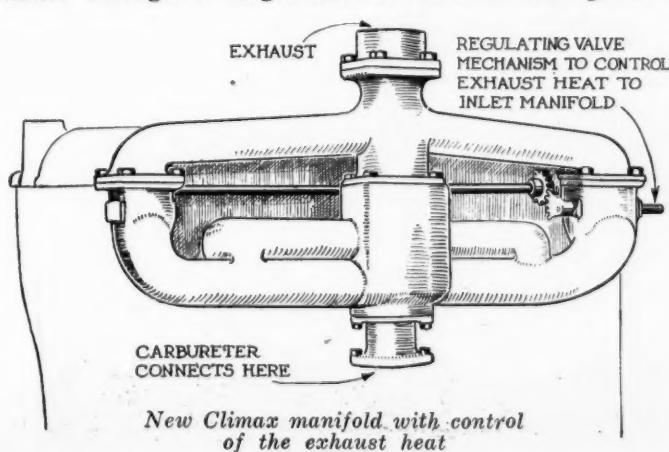
whirling motion, which causes the air to collect close to the outer wall, and as the communicating passage between the lower and upper chambers is at the center of the cylindrical chamber, the dust falls to the bottom, where it is absorbed by stale crankcase oil contained in a removable cup. In the upper part of the cylindrical chamber there is a filter of fibrous material through which the air has to pass on its way to the carburetor, and the passage between the lower and upper parts is of such design that it gives a further centrifugal motion to the air. Thus the air is subjected to two centrifugal cleanings before it is passed into



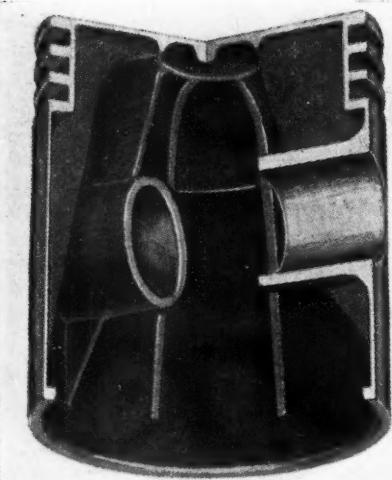
Pomona Vortox air cleaner United Mfg. Co. air cleaner

the filter, with the intention of preventing rapid clogging of the filter.

The air cleaner of the United Manufacturing and Distributing Co. is of the dry centrifugal type. As may be seen from the sectional view, the air enters at the top and immediately strikes a rotary baffle which is provided with two sets of fins. The fins give a rotary motion to the air current, throwing the dust against the walls of the chamber. After passing the edge of the baffle the air is compelled to reverse its direction of motion, passing upward and inward to enter the L shaped outlet of the cleaner. The hub of the rotary baffle is mounted centrally in the outlet and carries a driving fan at its lower end, by which the baffle is set in rotation. The dust drops down the walls of the cleaner and collects in a readily removable cup, while the clean air passes out through the side of the cleaner. In the drawing an oil cup with wick feed to the baffle bearing is shown, but this has been replaced by an oil-less bushing in the hub of the baffle.



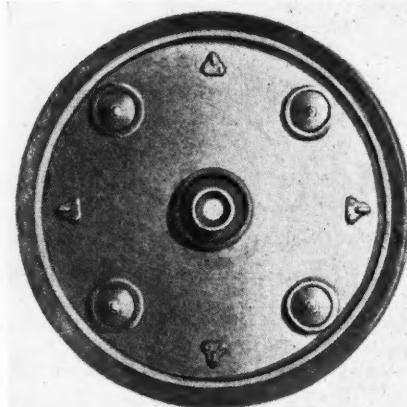
New Climax manifold with control of the exhaust heat



Clark-Turner light cast iron piston

The Clark-Turner pistons, which are cast iron pistons of unusual lightness, were shown by Litter's Motor Machine Shop. These pistons are made with very thin walls and a considerable number of ribs to strengthen the piston and help carry the heat from the head to the skirt. The advantages are those of lighter reciprocating parts. There is less vibration and less strain, owing to the reduction of the inertia forces.

Whitehead & Kales Co. showed rubber-tired wheels for use on Fordson tractors to adapt them for operation on the roads. So equipped the Fordson can be used for hauling loaded trailers on the road, for switching freight cars, for drawing snow plows, etc. The rubber-tired tractor has been found useful by municipalities, factories, contractors, coal and building supply dealers, and road builders. The wheels are made of metal disks, are hollow, and the rear ones can be loaded either with water, sand, cast iron chips, or cement to increase their weight and thus get additional traction. One of the disks is made with four hand holes through which the loading material can be introduced. Each disk is also provided with four hooks for the con-



W. & K. rubber-tired wheels
for Fordson tractors

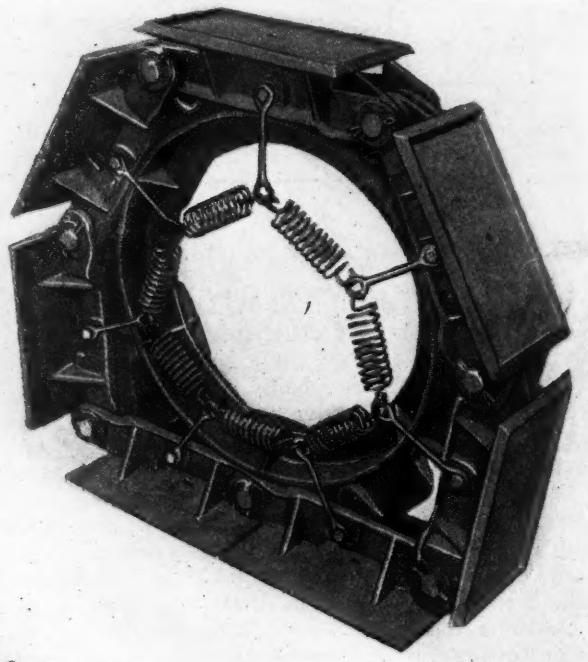
venient attachment of anti-skid chains.

The rear wheels are equipped with 40 x 5 in. S. A. E. standard solid rubber tires, and the front wheels with 24 x 3 in. The wheels and tires are shipped fully assembled, ready to be placed on the tractor.

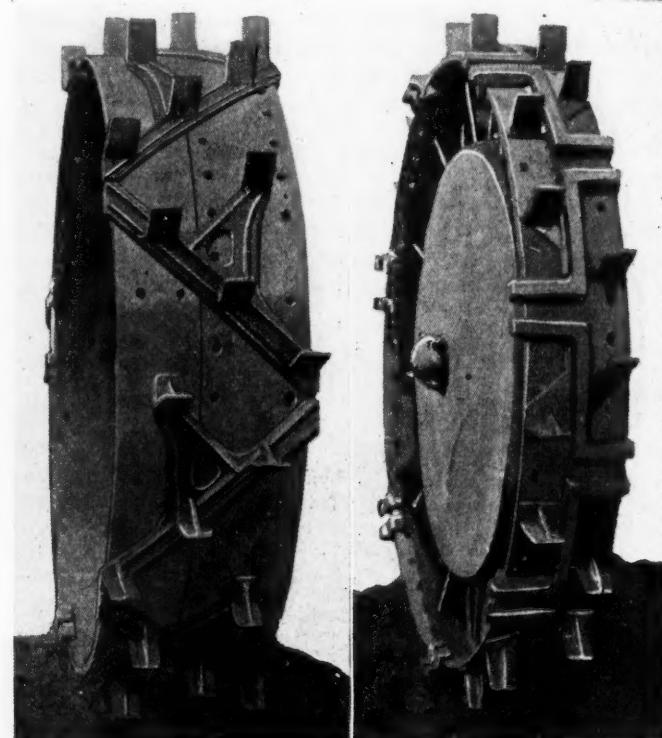
The Whitehead & Kales Co. has also brought out a new design of tractor wheel which combines lightness with great lateral and radial strength. The rim is made of rolled steel with inwardly turned flanges, but the rim proper, instead of being made flat, is formed with two substantial corrugations. The spokes are arranged so that the two sets cross; at their inner ends they are riveted to steel disks cast into the gray iron hubs, and at their outer ends they are riveted to the rim at the corrugations—not to the flanges. This obviates the weakening of the flanges by rivet holes and adds considerably to the strength of the wheel.

The Miller traction tread is a device which is claimed to give with a wheel tractor some of the advantages of the creeper type. There are seven cast steel shoes, cast integrally with the links of the chain. The links are joined together with hardened, cold rolled steel pins, fitted with rollers, which pass through elongated holes in the ends of the links. These elongated holes allow a reciprocating action to take place between the ends of the links. Upon this reciprocation depends the proper movement of the separate links as they pass over the sprocket. At the center of each link there is an additional pin with roller which takes the thrust from the sprocket teeth.

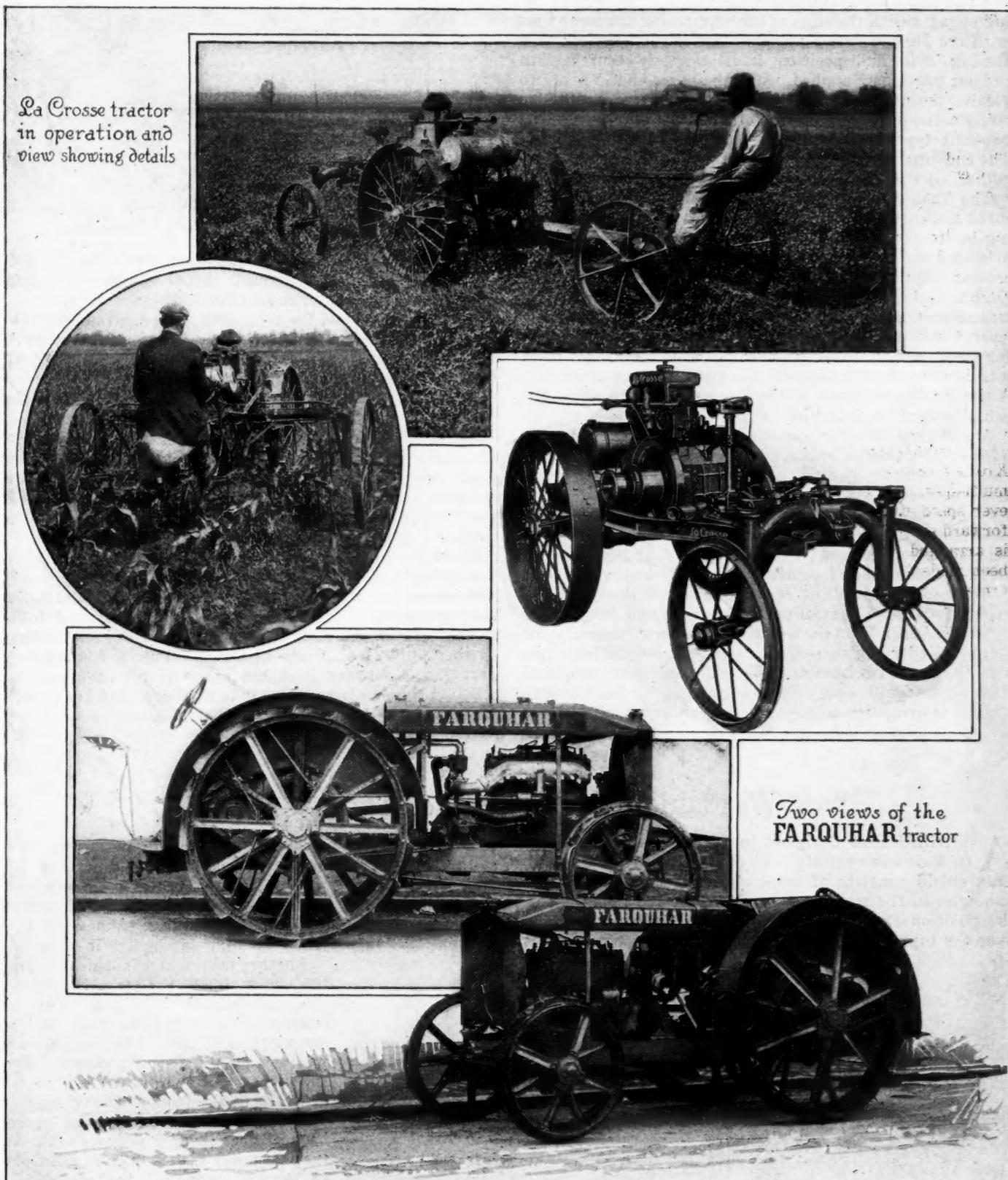
The complete tread unit is mounted on a cast steel sprocket which is secured to the side of the regular tractor wheel. The tread can be removed by removing one pin, stretching the links flat on the ground and rolling the tractor off. The sprocket does not interfere with the operation of the round wheel. This tread is made especially for the leading makes of garden tractor.



Above—Miller traction tread
To the right—Benz tractor lugs, single-unit and
two-unit types



Two New Tractors Exhibited at Recent Show



The above illustration shows the Farquhar 15-25 and the new La Crosse tractor, both of which were shown for the first time at the recent Columbus tractor show. Descriptions of these tractors appeared in our issue of February 24, but the photographs did not reach us in time for insertion in that issue. As will be seen from the illustration, the feature of the La Crosse is the line drive, which makes it possible for the driver to ride on the implement and saves the services of one man when operating grass mowers, self-binders and manure spreaders. An unusual feature of the Farquhar is that it is spring-suspended at both the front and the rear

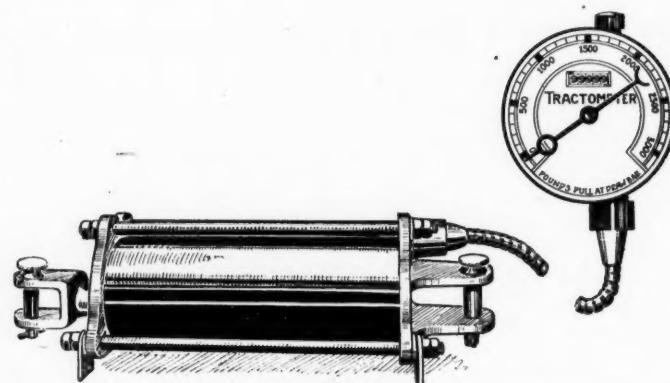
The Benz tractor lugs were exhibited by the Lebanon Steel Foundry. These lugs embody a quick detachable principle. When applied to the wheel, the lug is placed on the rim and drawn to one side so that the channel of the lug engages with the edge of the rim, and at the same time with the lug previously put on. The next movement puts the lug in its final position, interlocking it securely with the one previously applied, while the other end is ready to receive the next lug. The lug is made in two styles, one being a one-unit type and the other a two-unit type. The two-unit type is suitable for both road and field work. The end lugs are provided with "eyelets" and are bolted together, so that a single bolt suffices for the assembly.

The Taco Calumet tractor hitch is a device which absorbs the shock on both the plow and tractor when plowing in stony soil. It consists of a hitching member comprising a coiled spring which compresses as the draft increases. On tractors on which the clutch pulls out, the hitch is installed to operate a lever when the plow encounters an obstruction, this lever being connected to the clutch lever. Thus the tractor is stopped when a rock is struck, for instance, but the plow is not disconnected. This hitch was designed to do away with the troublesome wooden pin. A similar device, known as the Tractorstop plow hitch, was exhibited by the Meili-Blumberg Co., Inc.

A governor for Fordson tractors was exhibited by the Krebs-Wells Controller Co. This was said to be a true multi-speed controller and to govern the engine at whatever speed it is set to. The governor is mounted at the forward end of the engine and its connection to the throttle is arranged in a neat manner. Similar governors have been made for truck engines since 1914. The Hartley Governor Co. also showed a governor for Fordson tractors.

Among the specialties for Fordson mention should be made of two line control devices and a front hitch.

The Kokomo Electric Co. showed a new magneto for single cylinder engines. This magneto is of the high tension type and is claimed to be dust and moisture-proof. Among the features of construction may be mentioned a laminated armature, mica condenser, platinum or tungsten



Drawbar unit and indicating head of Tractometer

contact points, windings treated with insulating varnish and taped with oiled silk, hard rubber collector ring and brush holder and Esterline magnets.

A device designed for measuring the drawbar pull exerted by a tractor in plowing or other drawbar work was exhibited by the Tractometer Co. and is known as the tractometer. It comprises a drawbar unit in the form of a cylinder with cast heads, each with a clevis for connection between the drawbar and the plow or other implement. This drawbar unit incloses the spring which transmits the drawbar pull and the compression of which measures the pull. An overload stop is built into the cylinder and is provided with a cushion for absorbing the jar due to overloads. This unit is furnished with a leather handle for easy handling.

From the drawbar unit a flexible cable extends to the indicating head on which the compression of the spring, and hence the drawbar pull, is indicated. It is claimed that this flexible connection between drawbar and indicating instrument eliminates errors in the readings due to the vibrations of the drawbar. This instrument is very much cheaper than the usual forms of hydraulic traction dynamometer, and it is believed that even tractor owners will purchase the instrument.

A Windshield Designed to Exclude Rain

A WINDSHIELD designed to exclude rain, snow and cold air has recently been devised by W. D. Crowell. This shield consists of two-glass sash and a sun-visor arranged in the manner shown in Fig. 1. When set in the position shown the air stream is deflected upward over the top of the vehicle, and is said to carry with it

rain and snow and also to ventilate the enclosure back of the shield by drawing air outward in the manner indicated by the arrows. Gutters placed at the lower edges of the visor and the upper sash carry off to the side any water which runs into them. When in the position shown, the clear opening is about 2 in.

Another design of windshield, called the down-draft pattern, is shown diagrammatically in Fig. 2. This is composed of three-glass sash and a sun-visor set, for use in stormy weather, in the position shown. Air carrying snow or rain is said to be deflected in the manner shown by the arrows without entering the space back of the shield. The space between the two lower sash is open at the ends to permit escape of the air which enters it. The two lower sash can be fixed if desired, the upper glass only being pivoted.

Patents to cover both designs shown have been allowed or are pending. The Zenite Metal Co. has been licensed to manufacture under these patents.

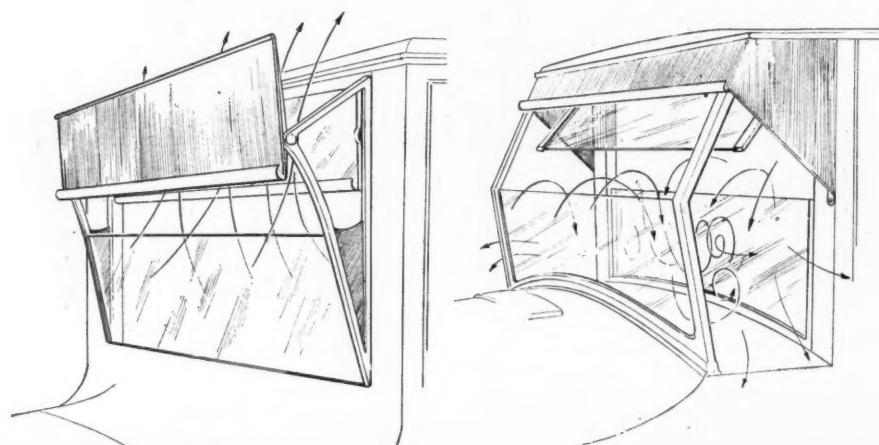


Fig. 1

Fig. 2

Diesel Type of Engine for Motor Vehicle Work

Has two pistons in same cylinder and works on two-stroke cycle. Injection results from explosion in ignition chamber connected with combustion chamber by narrow passage. Separate air compressor not required.

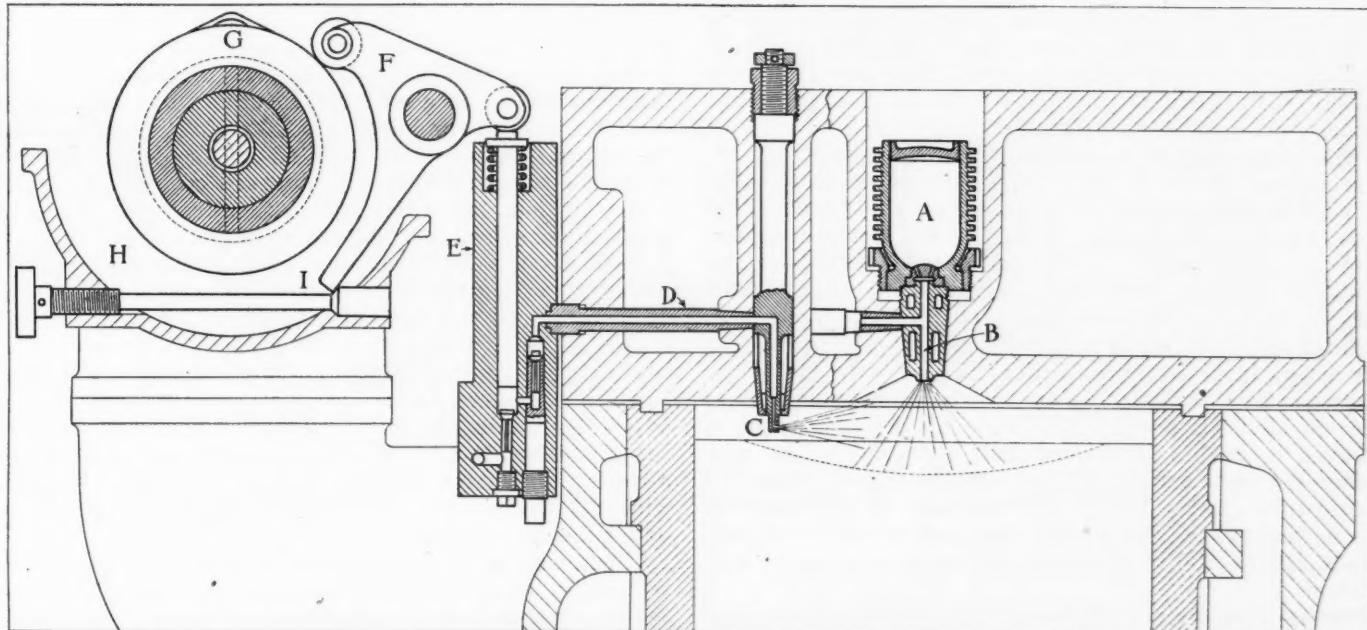
A SINGLE cylinder two-piston engine working on the two-stroke Diesel principle but without an air compressor has been built by the Deutsche Automobil Constructions Gesellschaft. The engine employs the Steinbeker method of fuel injection. According to our German correspondent, the first engine is now undergoing tests. The cylinder has a bore of 130 mm. and a stroke of 160 mm. per piston, making the combined stroke of the two pistons 320 mm. This is equal to a single cylinder engine of 5.12 in. bore and 12.6 in. stroke. The output is said to be 35 h.p. at 850 r.p.m., which corresponds to a brake mean effective pressure of 63 lb. per sq. in. The over all length is only 37 $\frac{3}{8}$ in. and the weight per horse power 22 lb., which is about the same as that of the average truck engine.

It is obvious that if the ordinary Diesel engine were to be built for automotive purposes the most difficult problem would be the construction of the multi-stage air compressor, which must furnish air pressure up to 1000 lb. per sq. in. This is eliminated in the Steinbeker engine, and a simple injection system substituted therefor. A sectional view of the Steinbeker fuel injection mechanism is shown in the cut. To the cylinder head is secured a small vessel called the ignition chamber, which communicates with the combustion chamber through a central passage called the firing passage. The cylinder is provided with the usual inlet and exhaust valves. One fuel jet delivers into the firing passage and

another into the cylinder direct. When applied to a four-stroke engine this injection mechanism operates as follows:

During the first inward stroke of the piston pure air is drawn into the cylinder, and during the following outward stroke it is compressed and some of it enters the ignition chamber, the pressure reaching a value of 450 to 500 lbs. per sq. in. During the end of this stroke fuel is injected into the firing passage and carried along by the rush of air into the ignition chamber. When the outer dead center position is reached the charge in the firing chamber is ignited by contact with the hot walls thereof, and the pressure in the ignition chamber then reaches 1100 to 1400 lbs. per sq. in. As a result a column of flame is projected into the combustion chamber. This carries along the fuel now entering the firing passage, spraying it into the combustion chamber. When the piston has traveled a short distance from the beginning of the power stroke the fuel supply is cut off and thereafter the charge expands until the end of the stroke. During the next outward stroke the piston expels the spent gases through the exhaust valve, which is then open. It will thus be seen that in the Steinbeker engine the pressure created by the partial explosion in the ignition chamber takes the place of the high pressure produced by the air compressor in the ordinary Diesel engine.

(Continued on page 509)



Diagrammatic illustration showing principle of operation of one type of Diesel engine. This principle has been employed in a recently designed automotive engine

Adjustable and Folding Seats Used on Many British Cars

Need for adjustable feature on driver's seat is met by several types of design described in this article. Front seats are also made detachable in some cases thus rendering more accessible parts located under the floorboards. Folding backs facilitate access to rear seats.

By M. W. Bourdon

FOR many years, even prior to the war, there has been evident a growing demand among British motorists for a means of adjusting the front seats so as to afford the most comfortable position for drivers of various leg lengths. This demand is now being met by an increasing number of makers, some content to make the two seats at the front an adjustable unit, others providing separate seats independently adjustable. The latter arrangement does not appear to be necessary to comply with requirements; it makes a more costly job if the degree of comfort afforded by the fixed seat be retained, and so long as the driver be conveniently placed for pedal operation, his companion's position does not matter, within reason.

Austin has quite a good and simple design of unit seat, as shown in Fig. 1, though there are but three definite variations available. The seat is located primarily by notches in the frame engaging with a stud projecting from the floor at each side, and is locked by slotted plates right and left just below the elbow line. The seat bottoms are hinged to tip up as shown, but this feature is only provided to render more accessible certain chassis details beneath the floorboards—the fuel tank, for example, which has its filling spout projecting through the floor under the right-hand seat.

Riley cars also have the unit seat arrangement (Fig. 2), the fore and aft adjustment being locked by a wing nut under each loose cushion, the latter also being secured, as shown, by similar means. The space below the cushions in this case provides accommodation for a few tools, jack handle, tire pump, etc.

Standard cars have separate seats independently adjustable as shown in Fig. 3. T-head screws locate them. Two threaded sockets are provided in the floor so that the range of adjustment afforded by the slot is considerably extended, unnecessarily so, in fact. The back upholstery of these seats is peculiar, for the hinged frame has a broad fabric band laced horizontally around it, while the upholstery is detachable, being held in position by a long inverted pocket which slips over the top of the frame. The Standard is one of the light four-seaters developed in England. The back of the front seat is hinged to enable an unrestricted entrance to the rear when the seats are placed well back to accommodate tall occupants. Here also the box-like base of each seat affords tool space. No springs are used in the back padding, the flexibility of the frame being considered sufficient.

In another light four-seater, the Enfield-Allday, one very wide door is provided at each side, and, to enable front and back passengers to have easy access the sep-

arate front seats have hinged backs and bases as shown in Fig. 4. Both seats are located by a cross member secured, as indicated, by means of a slotted tongue and wingnut. This form of seat is obviously applicable also to sedan bodies with single doors, a variation of the Enfield arrangement appearing in the Arrol Johnston sedan (Fig. 5). Here the passenger's seat is non-adjustable fore and aft, though detachable and provided with hinged back and base. The driver's seat differs in having fore and aft adjustment and being located by rails and a pin lifted from or pushed into a floor socket by a forward projecting lever.

Some of these adjustable seats, it will be noticed, are distinctly low in height from floor to top of the cushion. The Albert (Fig. 6) is more so than most, being only 9 in. high at the front. These seats are, in fact, little more than cushions with a folding back attached to them. The baseboard is secured to the floor by cap screws.

None of the examples illustrated are so elaborate in construction or finish as those fitted to high class sedan bodies, for the latter are more in the nature of movable armchairs. Those specimens selected for mention here are applied to cars of quite moderate price (as prices run nowadays) and are standard in the British cars named, which sell at from \$3,000 to \$4,000 with four or five-seated bodies.

A more elaborate type of seat with anchorage and means of adjustment favored in many high class bodies is that shown in Fig. 7, where each separate seat has metal panelling on a well upholstered framework. The seats run on rails and are located by studs dropping into the central runner and operated by the levers shown. This is a pattern frequently observed on specially built sedan bodies, the covering of the cushions and upholstery being usually Bedford or corded cloth.

Besides the advantage which adjustable seats afford in respect of leg reach, a consideration by no means unimportant is the fact that the front seats being removable, the floorboard can be made removable also to enable the chassis details below to be reached with ease. This fact has been borne in mind in several cases where adjustable seats are fitted, though the advantage concerns mainly those chassis in which the gearset is mounted amidships, and is, therefore, usually located, with the transmission brake and propeller shaft joint, under the front seat.

Users who have had experience with adjustable and removable seats point out the great desirability of the seats, whether they are separate or formed as a unit, fitting closely to the body sides, otherwise the front passengers suffer from additional draughts which are en-

Fig. 1. Unit seat used on Austin car with slotted plate locking device.

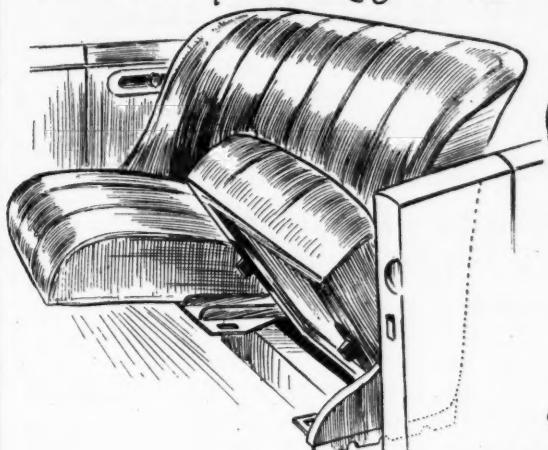


Fig. 2. Seat arrangement on Riley car showing wing nut locking device.

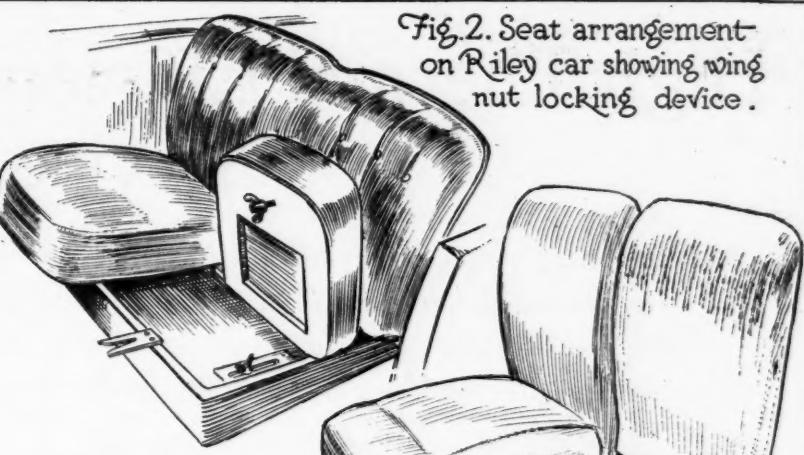


Fig. 3. Separate adjustable seat on Standard car. Back upholstery is detachable.

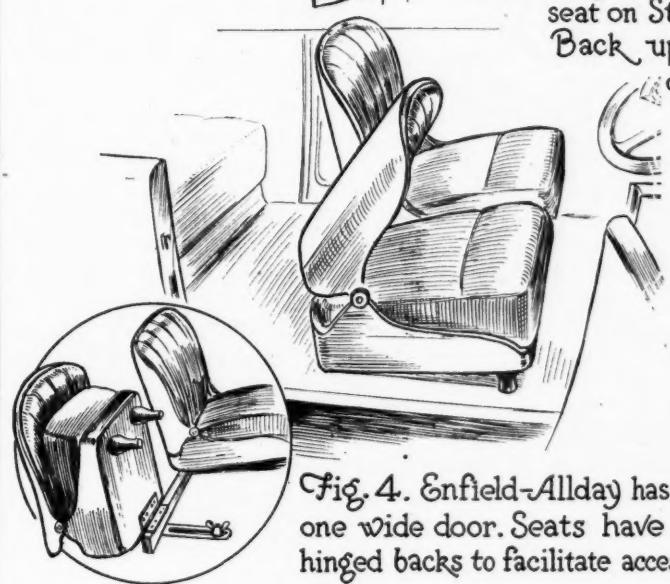


Fig. 4. Enfield-Allday has one wide door. Seats have hinged backs to facilitate access.

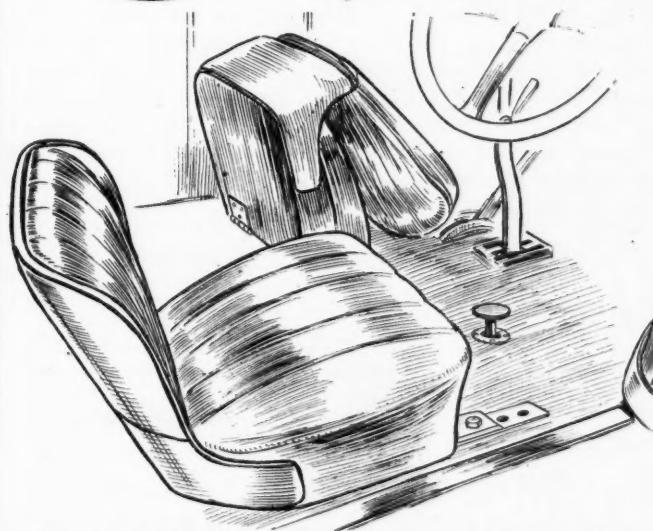
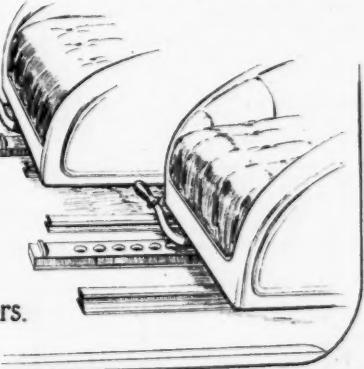


Fig. 6. Folding seats on Albert car are only 9 inches high and are attached to floor by cap screws.



Fig. 5. Arrol Johnston sedan has non-adjustable passenger seat with base and back. Driver's seat is adjustable.

Fig. 7. Type of adjustable seat used on many high grade cars. It slides on rails and is located by studs operated by levers.



couraged to swirl around the legs and between the seats and the body.

Another point to be borne in mind is that a closely fitting loose seat, unless it is in some way attached to the sides of the body, is liable to hammer and rattle

against the latter when vibration and frame distortion have their natural effects. Hence the Austin arrangement (which, by the way, is not unique), wherein the seat is fastened to the body framing, is not without special merit.

High Thermal Efficiency in Airplane Service

Advantages and disadvantages of two types of mixture control devices are discussed, and test data showing the fuel saving made possible by the use of higher air to gas ratios are given, as are also particulars showing the corresponding effect on the power developed.

By S. W. Sparrow*

DETAILS of design of certain foreign engines, whose high *average* efficiency has received much publicity, are of interest. During an examination of these engines at the Bureau of Standards, an unusual type of air-fuel ratio control suggested itself as a possible source of the high efficiency. Fig. 2 shows this type diagrammatically, while Fig. 1 is typical of a construction common on American engines. In the latter type, the rate of fuel flow is altered to produce the mixture ratio changes. This can be accomplished by restricting the fuel passage or, as shown in the figure, by changing the head producing flow through the agency of a valve in the passage connecting the float chamber with the carburetor throat. Similar results are frequently obtained by a type similar to that shown in Fig. 2, but so proportioned that the mixture ratio change is not accompanied by any appreciable change in the quantity of charge supplied. In contrast, Fig. 2, to typify the foreign construction, is assumed to be so designed that the leaning of the mixture is always accompanied by an increase in the amount of charge supplied. This can be effected by interconnecting the throttle with a device for altering the size of the fuel orifice or, as shown in the figure, by an auxiliary throttle which admits a very lean mixture of pure air. For this auxiliary throttle to be effective, the carburetor throat must offer a considerable restriction to air flow. The important difference between the two types is that in the one shown in Fig. 1, the change in power produced by a mixture change is due almost entirely to the change in power-

producing ability of a unit weight of the mixture, while in the other type there is always the additional effect of the quantity change necessary to bring about the change in mixture quality.

Fig. 3 indicates the economy that is possible with the type shown in Fig. 1. The curves shown in full lines are based on tests of an 8-cylinder aviation engine at an altitude of 5000 ft. and a speed of 1600 r.p.m. It will be noted that a decrease in the specific fuel consumption of over 15 per cent is secured when the mixture is leaned, until there is a decrease of 10 horsepower in 150, i.e., 7 per cent. Unquestionably then, so long as this type of control has sufficient range, its proper handling will result in a marked fuel saving. Will it receive such handling? To realize how unlikely this is, it must be remembered that continuing the mixture impoverishment will ultimately result in a blowback in the carburetor, a likely cause of fire. Knowing that safety depends on not reaching this condition and lacking knowledge as to how close to it a given carburetor setting is, the pilot has every incentive to adjust away from, rather than toward, maximum efficiency. Even were it possible to eliminate the fire hazard, the problem would be far from solved. In flight, the only measure of performance ordinarily available is that of power as indicated by the engine speed. In spite of all evidence as to the benefit of the lean mixture from the standpoint of efficiency, such an adjustment, inasmuch as it results in lower power, the only gage of performance available to the pilot, is bound to be unnatural.

*Technical Note No. 39 of the National Advisory Committee for Aeronautics, abbreviated. Based on tests made by the Automotive Power Plant Section, Bureau of Standards.

DIAGRAMATIC ILLUSTRATIONS OF TWO METHODS OF VARYING FUEL TO AIR RATIO.

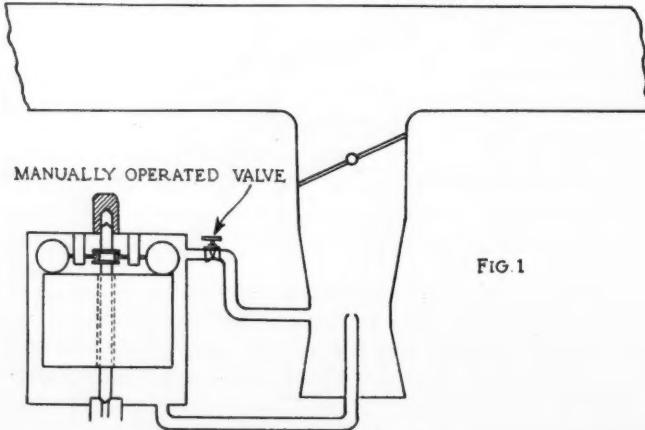


FIG. 1

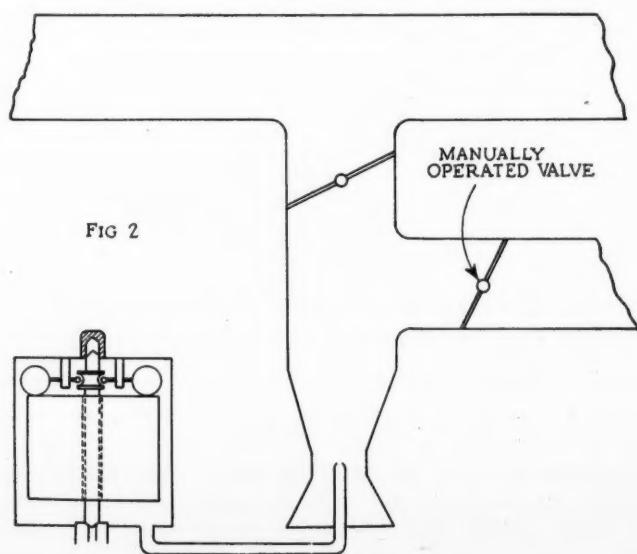


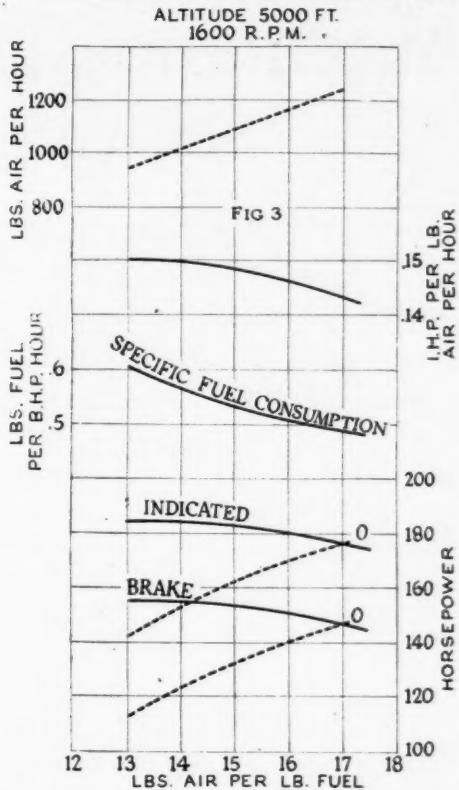
FIG. 2

The explanation of the disadvantages of the first type makes clear the merits of the second. With this, as the mixture becomes of poorer quality, the amount supplied is increased. The natural adjustment, that for maximum power, will be the one at which the decrease in quality ceases to be overbalanced by the increase in quantity. If the design is such that this point is always reached before the mixture becomes lean enough to cause a blow-back in the carburetor, there is a considerable safeguard against fire.

Since this type of control permits the maximum weight of charge to be supplied only when the mixture quality is such as to give a comparatively low power output per unit weight of charge, it is obvious that the greatest engine power will be slightly less than with types which permit the maximum power producing air fuel ratio to be obtained when the maximum weight of charge is supplied. This constitutes the chief limitation of this construction. That the marked advantages of this control appear only at full throttle can scarcely be considered a fault, as most commercial flying can be expected to take place under these conditions. An example of the variation of power that might be expected at different mixture ratios is given by the dotted lines of Fig. 3. Suppose the point O to indicate the desired mixture ratio for operation and hence the point at which the design permits the maximum charge to be supplied. The power at the other throttle positions has been estimated from the weight of air required to give the various mixture ratios and the indicated horsepower developed per pound of air at these mixture ratios as determined from the full line curves.

In the over-dimensioned engine, parts are designed for the stresses of full throttle operation at a certain altitude and the throttle closed so as not to exceed this power at lower altitudes. The mixture ratio control described above forms an admirable safeguard against full throttle operation at these altitudes, inasmuch as, under

EFFECT OF MIXTURE RATIO ON POWER AND ECONOMY OF AN AIRPLANE ENGINE



these conditions, it supplies a mixture too lean for engine operation. Moreover, some of the previously mentioned power loss at full throttle can be offset by an increase in compression ratio. A throttled engine can employ a higher ratio with safety than one operating at full throttle.

A Two-Cylinder Air-Cooled Aircraft Engine

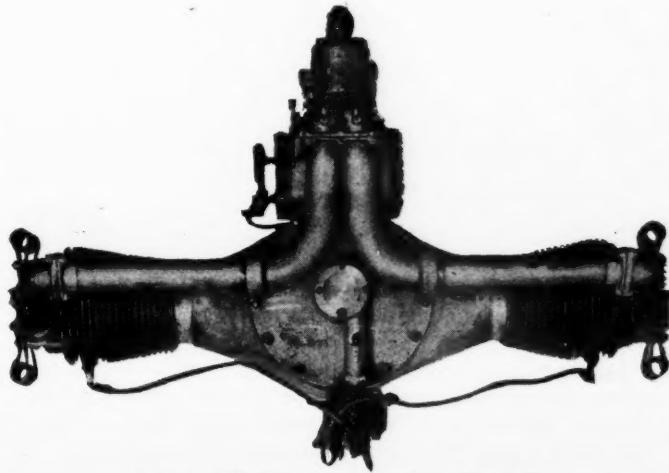
FOR light sport planes the air cooled two-cylinder opposed engine seems to offer advantages. An engine of this type, rated at 40 hp. and weighing 128 lb., is being produced by the Aircraft Repair & Service Co. It has 4 x 6 in. cylinders cast of aluminum, with steel liners. Aluminum pistons with crowned heads are used. These are fitted with two rings at the top and a scraper ring below the piston pin. Large holes are drilled in the piston

skirt to reduce its weight. The connecting rods are of H section, one straight and the other forked, hence the crank is of the single throw type and both pistons always move in the same direction. To minimize vibration, counterweights are secured to the crankshaft arms. The cylinder heads are detachable, and the valves, located in the heads, are operated by individual adjustable rocker arms.

The lubricating system is of the dry sump type, all excess oil returning to an oil sump which is provided with cooling flanges. Oil is pumped to all bearings by a gear pump, a constant pressure being maintained.

The carburetor is a Zenith and ignition is by a Philbrin battery system. To prevent chilling of the incoming charge by the slip stream, the inlet manifold is located back of the engine. A ball thrust bearing is provided to take up the propeller thrust. The over all length of the engine, inclusive of the propeller hub, is 25½ in.; the width over the rocker arms, 42 in.; the height, 25 in., and the distance between supporting arms, 19 in.

ACCORDING to the present outlook, motor car manufacturers in France will have little business until trade generally is on its way toward recovery. Meanwhile firms are finding it difficult to tide over the crisis. Some are drifting into new fields; one is making machinery for contractors and marine work, another is hoping to secure a Government order for gasoline locomotives.



A two-cylinder opposed aircraft engine

Automatic Control Employed in Spring Production

Lost motion has been very nearly eliminated in the manufacture of springs by a prominent Detroit company. Automatic recording pyrometers control electrically the thermostat on the gas burners of the furnaces. In other phases of spring production, also, mechanical devices have replaced skilled workmen to a large extent.

By J. Edward Schipper

AUTOMOBILE spring manufacture has been placed on a production basis with automatic control and the opportunity for error through the human equation has been reduced to a minimum by the Detroit Steel Products Co. Recently, the entire plant was overhauled and additions completed which introduce highly advanced methods and far greater efficiency into this branch of manufacture. With the additions, the plant now has a capacity of more than 6,000,000 lb. of springs each month.

All varieties of chassis springs are manufactured, including those for the heaviest motor trucks and trailers, as well as lighter springs for passenger cars, but so flexible is the arrangement of the production equipment that small orders or large tonnages, calling for long runs, can be produced with equal efficiency and economy.

The uninterrupted flow of this large variety of material through the plant has been accomplished by methods and devices so arranged that from the storage bins of raw material to the final inspection there is practically no lost motion. Specially designed equipment, largely the product of the company's engineers, plays a large part in maintaining this unusual output.

The routing of the steel through the plant is, in general, a series of continuous steps in each of the shop units. Interruption of production has been guarded against by the installation of duplicate machines throughout that can be put into service when the emergency arises. So far has this plan been carried that even two costly conveyor tempering furnaces have been installed and held in reserve, ready to be switched into the production line when needed.

The speed of production in this plant is based entirely upon the output of the furnaces. The dimensions and composition of the steel plates regulates the speed at which the furnaces are operated. When thin light plates are passing through the heat chambers, the speed is increased, and when plates of greater thickness and weight are treated, it is decreased. The tonnage of the shop will remain approximately the same, of course, whether large or small plates are being run, since a greater number of small plates will pass through the furnace in a given time.

Spring quality is based upon the heat treatment of steel. The furnaces, which are the latest type of automatically controlled, gas-fired type, were built by the McCann Harrison Co. Gas has replaced oil as a fuel because it causes less oxidization and scaling of the steel as it passes through the furnaces. Moreover, the tem-

perature is much more easily controlled with the gas flame, and there is no carbonizing of the burners as was the case when oil fuel was used.

Automatic recording pyrometers electrically control the thermostats on the gas burners of the furnaces. So accurate are these controls that the heat is held within five degrees of the required temperature. Each of these instruments is locked in a glass case near the furnaces and the thermostatic controls are so guarded that workmen in the shop cannot tamper with them. Each pyrometer furnishes a permanent record of the performance of the furnace which gives the metallurgists and chemists a basis on which to make tests and experiments.

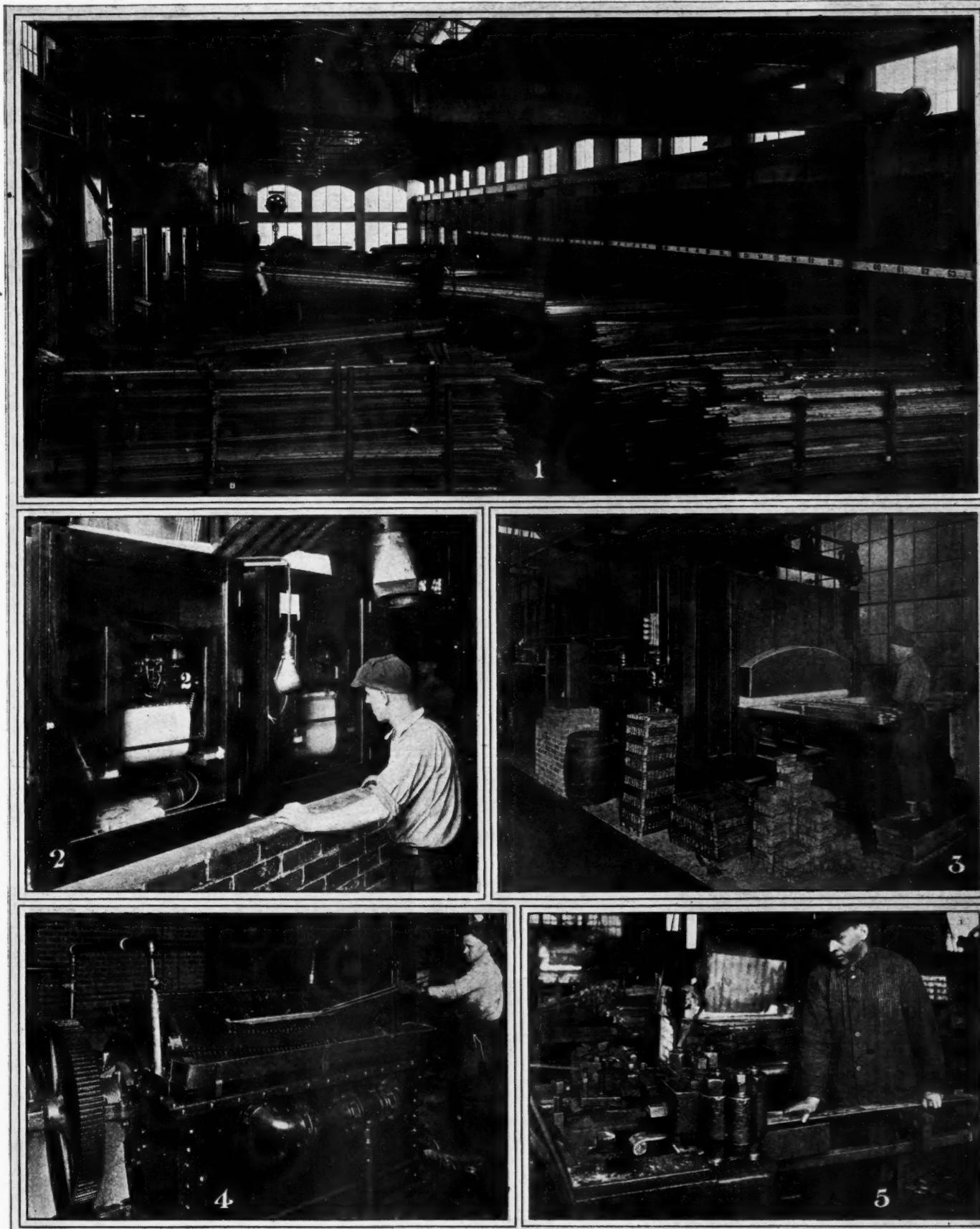
Before the automatic controls were perfected, it was necessary to depend upon the skill and judgment of the individual workman. The temperature at which the furnaces were operated was more or less a matter of guess work. A large corps of skilled operators was necessary to continually make adjustments on the burners in order that an approximately uniform heat might be maintained. To-day, human skill and judgment with their chance of error has been practically done away with, and the experience of the workman has little or nothing to do with the tempering of the steel in this plant.

Every lot of steel, even before it is removed from the railway cars, is subjected to tests by the metallurgists and chemists. Frequently, samples are tested along the production line. The photo microscope is constantly used to reveal the physical structure and character of the metal in the various stages of manufacture.

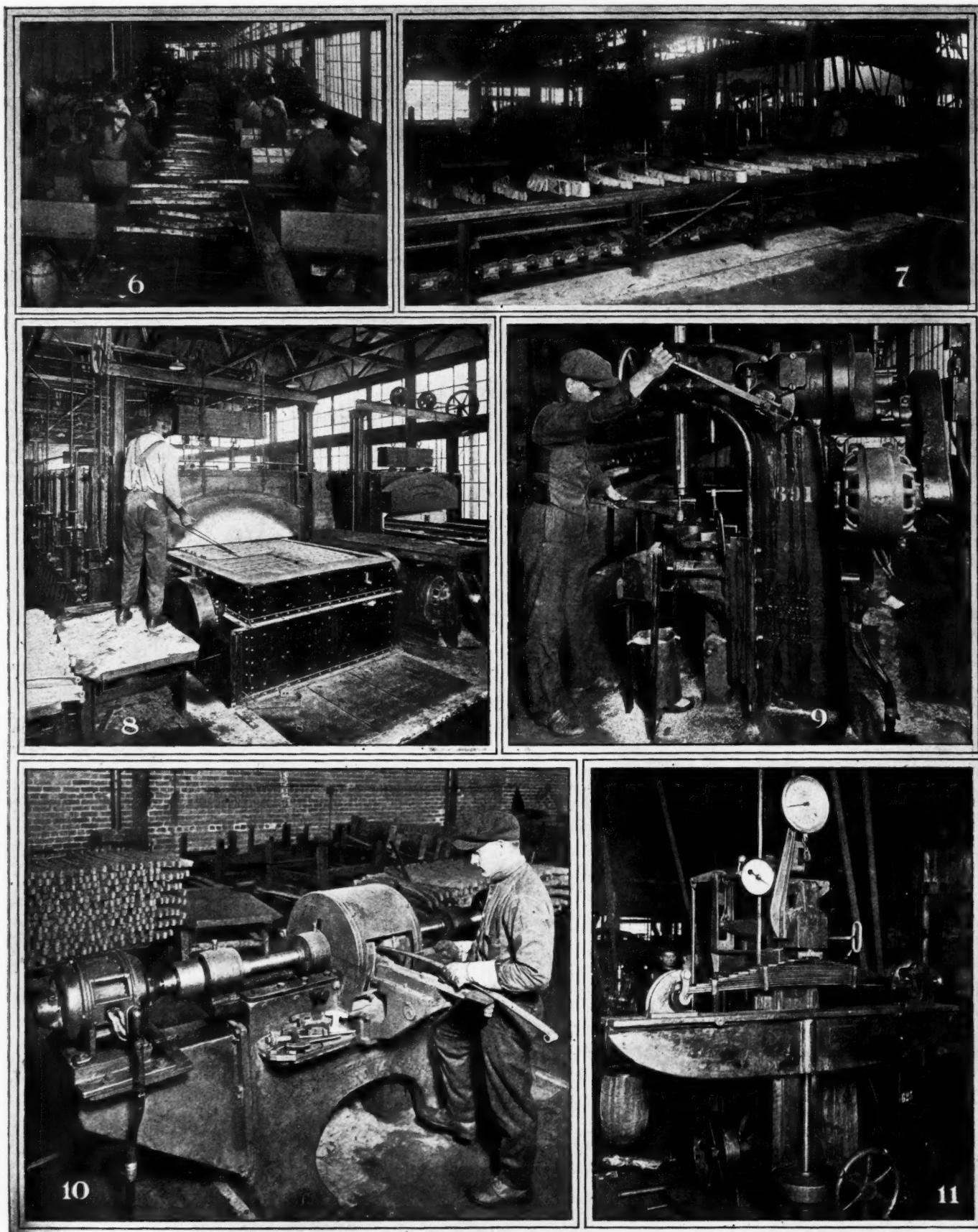
Figures and statistics given out concerning the steel are based entirely upon shop production, and not upon those compiled under ideal conditions by different societies and organizations. This feature is unique in that it tells the absolute facts about the springs. On the short leaf of each spring is stamped the date of manufacture and the key number which refers to the heat treatment. In case of trouble, this enables the engineers and metallurgists to make an accurate and intelligent analysis.

Proceeding with the first step in spring making, the long strips of steel are taken from the storage bins by the traveling crane and deposited directly upon the shearing tables where they are cut to the desired lengths. The varying length of the bars is carefully watched so that there is a minimum of waste. This item has been so closely figured that the present total loss of metal is less than 5 per cent for the entire production.

From the shears, the plates from which the main



1—The 20,000 tons of spring steel are carried in storage bins. 2—Electric controlling pyrometers are locked in glass cases and guard the constancy of the temperatures of the furnaces. 3—The McCann-Harrison walking beam type, gas fired tempering furnace. The output of these tempering furnaces controls the speed of production of the plant. 4—This machine, designed by the plant engineers, is new in the spring industry; it forms the camber in the spring leaves and tempers the leaves in an oil bath. 5—The McKenzie three-operation eye machine. First, the end of the white-hot plate is "shaved" and bent; second, the loop of the eye is made; third, the entire plate is aligned by means of special gages



6—Complete sets of spring leaves are placed on the farther end of this conveyor table. When the spring is taken off the table it is ready for shipment. 7—The conveyor assembly table. It will be noted that four distinct types of springs are being assembled at the same time. 8—The "Draw-Fire." This is the McCann-Harrison low temperature furnace where the temper in the leaves is "drawn." 9—Hercules arbor broaching machine that broaches the bushings in the eyes of the main plate of the spring. This machine is of special design to meet the requirements of a single operation. 10—Facing machine which grinds the face of the eyes where they will be attached to the shackle bolts of the motor vehicle. 11—Olsen capacity machine by which the finished spring gets a thorough test.

leaves are to be made are carried on small trucks to the forges where the ends are heated before passing through the "three-operation" eye machine. The red hot plates are placed in the machine and first the ends are scarfed and bent; second, the loop of the eyes are formed; third, the entire plate is aligned. This last operation assures the center line of the eyes being at right angles to the center line of the plate and parallel to its flat surface.

During this time, the other spring plates are sent to the punch presses where the ends are cut to the "diamond point" and the center bolt and clip bolt holes are punched. Trimming spring plates to the "diamond point" is rapidly replacing the old tapering process in which the metal was rolled thin at the ends. Engineers throughout the automotive industry favor this change.

The plates are now sent to the automatic gas fired furnaces. These furnaces are the walking beam type. The steel plates are laid on the bed of the furnace, and at regular intervals, three beams which run the entire length of the furnace raise the plates from the tile bed. By a cam mechanism, the beams then move forward a few inches, carrying the plates, and then lower them again to the bed. This process is continuous and every complete movement of the beams advances the entire contents of the furnace. Like all others in the plant, these tempering furnaces are controlled by the automatic pyrometer system, and do not require the attention of skilled operators.

Emerging from the tempering furnace, each glowing plate is immediately placed between the laminated teeth-like jaws of the forming machine. The operator closes the jaws and the plate is bent to the required camber and firmly held. The head of the machine then revolves and the plate is plunged into an oil bath and the temper is set. A moving steel conveyor belt carries the plates from the bath. A pumping system keeps the tempered oil in constant circulation, the hot fluid being piped to a cooling tower and the cool oil returned to the tank.

This machine is the product of the company's designers and embodies the qualities of speed and accuracy. With every complete revolution of the head, the spring is formed, with such precision that scarcely any adjustment is necessary. This is one of the greatest labor saving devices in the plant. Before this machine was perfected, it was necessary to employ a large force of workmen to make adjustments and fit the several plates in the spring. By this new process, the plates are made uniform and interchangeable.

All leaves which have passed through the forming machine are now placed in the low temperature automatic conveyor furnace. Here the temper is "drawn"; that is, the brittleness is taken out of the steel and it acquires the properties of elasticity and toughness. Here again the necessity for human judgment has been eliminated by use of the automatic pyrometer system.

After cooling to atmospheric temperature, the leaves are gathered in sets as they will be assembled and placed on the conveyor assembly table. The entire length of the table, on both sides, is flanked with machines, each operated by a single workman.

First, the bushings are pressed into the eyes of the main leaf by means of an arbor press of special design. This machine is so adjusted that when the bushing is flushed with the flat surface of the eye, the pressure is released. All the plates are rough polished on the bearing surfaces. Farther down the table, the bushings are broached to within one-thousandth of an inch of the specified dimension. The ends of the main leaves are faced in a special grinding machine with parallel wheels which are simultaneously pressed against the sides of the plates.

After this operation has been completed, the rebound clips are riveted to the leaves and the graphite lubricant is applied. The complete set of leaves is now pressed together in the "bolting-up" machine and the center bolt is fastened. The clip bolts are put in place and the nuts are riveted.

So efficient is the assembly plan that as many as five different springs can be assembled on the moving table at the same time. This has been found feasible in view of the elaborate inspection system employed in all stages of assembly.

That the complete spring will "stand up" with a wide margin of safety must be known to an absolute certainty before the spring leaves the shop. Every spring is, therefore, passed through the capacity test machine. Here every spring is placed under a load twice as great as that which it will be required to bear when it goes on duty in the automobile or truck. Every spring must stand this test without showing any excess deflection or permanent "settling." The clips, the bolts, the eyes, in fact, every part of the spring is tested on this machine. Every detail is minutely inspected before it is finally O. K.'d for the customer. The springs are then sent directly to the loading platform where they are weighed and checked for shipment.

Diesel Type of Engine for Motor Vehicle Work

(Continued from page 501)

The ignition chamber is not jacketed but is provided with cooling flanges. In the illustration, E is the auxiliary fuel pump which delivers fuel to the auxiliary jet C through pipe D. It is a simple plunger pump operated by cam G and lever F. Below the camshaft is a small control shaft H with stop I. The main pump, which is not shown, is of the same type and driven in the same manner.

In regular operation the ignition chamber is at a high temperature. The engine is started cold by means of an air bottle which is filled, while the engine is in regular operation, with high pressure air from the engine cylinder. A period of 30 seconds is said to be sufficient for starting, and during this period sufficient fuel flows through the auxiliary jet C for operating the engine under its own power and heating up the ignition cham-

ber. Then operation on the regular cycle begins. The Steinbeker engine is said to be as easily reversible as the regular Diesel engine, a feature which is of importance in marine work.

New English Aircraft Engine

WORD comes from England of a new Napier aircraft engine of over 1,000 hp. It is an X-type engine with 16 cylinders, designed by J. Rowledge, and is said to weigh not very much over 2 lbs. per horsepower. This would seem to indicate that British designers are going in for heavier, more substantial engines, because a specific weight of 2 lbs. per horsepower was very closely approached in the Liberty engine, which is 400 hp.

New Automatic Chucking Lathe Developed at New England Plant

The Hartness automatic chucking lathe is a new tool specially suited for turning up ring gears and similar parts. The tool carriages are mounted on cylindrical bars which slide in bushings at both ends of the frame.

By P. M. Heldt

A NEW tool specially suited for turning up such parts as automobile ring gears has been developed by the Jones & Lamson Machine Co. The objects in view in the design of this machine were to produce a

chucking lathe that would eliminate errors from indexing and that would be of great rigidity, so as to permit very accurate work to be turned out and at the same time using high cutting speeds. As an indication of

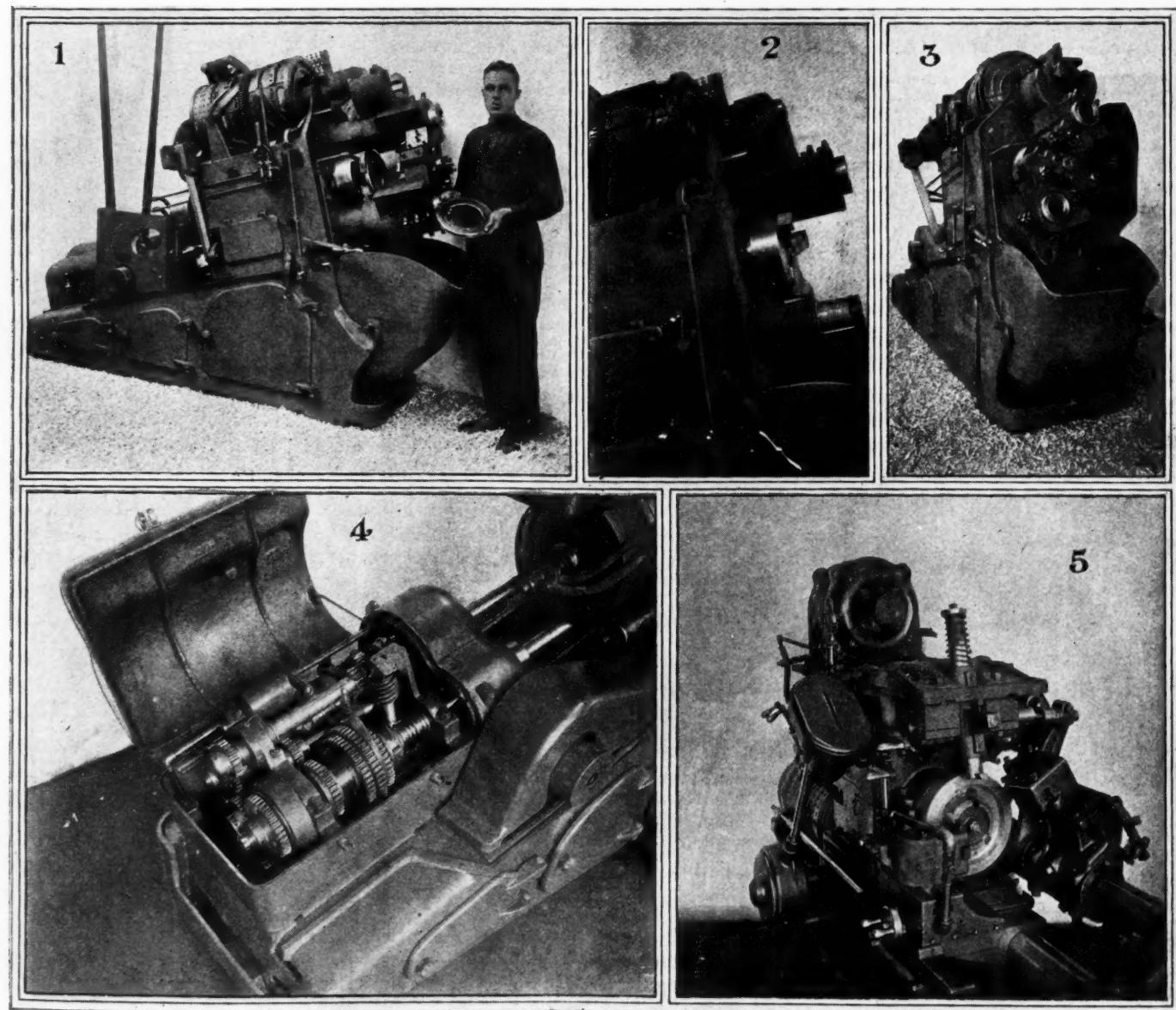
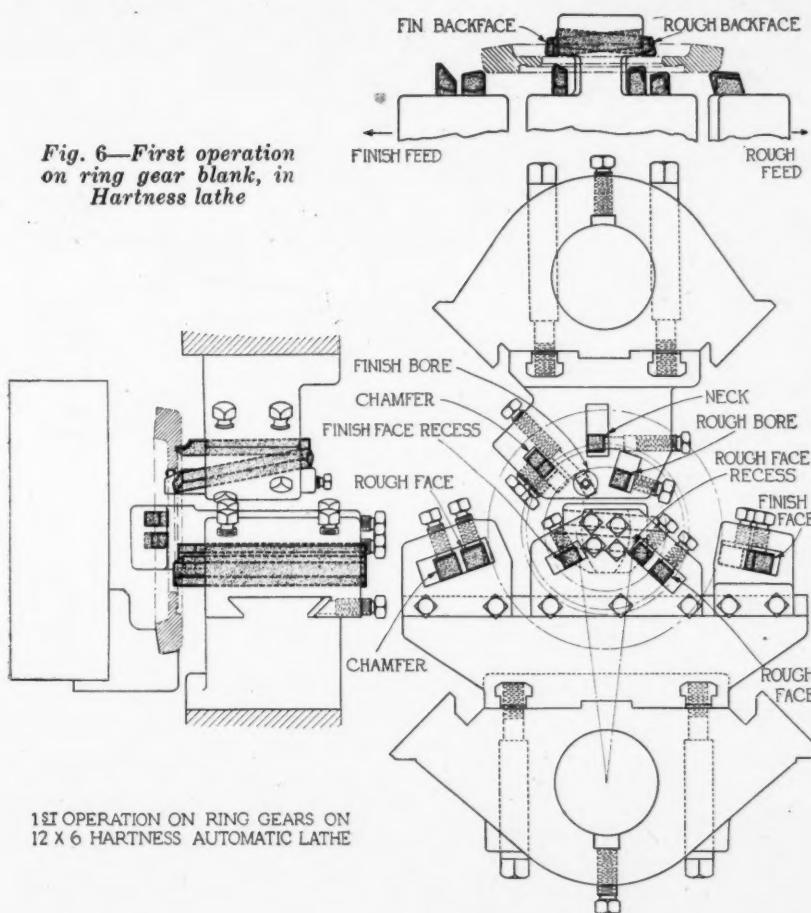


Fig. 1—Hartness automatic chucking lathe. Fig. 2—Showing chuck located between front bearings of tool head bars, so as to avoid overhang. Fig. 3—Front view of Hartness automatic chucking lathe with tool heads in place. Cross feed for facing cuts is obtained by giving an angular motion to lower tool head bar. Fig. 4—Change gears of Hartness lathe. Fig. 5—Second operation on ring gear blank, in Fay automatic lathe with pneumatic fixture

Fig. 6—First operation on ring gear blank, in Hartness lathe



what can be done on this machine in the way of rapid production, it is stated that on cast iron, cutting speeds of 125 ft. p.m. can be maintained on the roughing cut and 175 ft. p.m. on the finishing cut. It is not practicable to give cutting speeds for steel, because the hardness of the steel varies so much with the treatment it receives previous to machining.

The maximum dimensions of work that can be handled in this lathe are 12 in. in diameter and 6 in. in length. Operation of the machine is entirely automatic. All the operator has to do is to chuck and remove the work and to start the lathe after a piece is chucked. The regular equipment provides for eleven changes of speed, from 25 to 135 r.p.m. The feeds for the cutting tools are controlled by cams mounted on a large cam drum. This drum is driven by change gears for the feeding movements and is also driven at high speeds for idle movements. The clutches and gears are located in a separate box at the rear of the machine and are rendered accessible by lifting the cover. The gears are of steel and hardened.

The tool carriages are mounted on large cylindrical bars which slide in bushings at both ends of the frame. The front bearings are in large bosses cast integral with the frame and are directly in line with the cutting strains, thus avoiding overhang. The upper tool carriage bears the tools for boring and turning cuts; it has an axial motion of 7 in. and can also be slightly oscillated so as to bring first the roughing and then the finishing cutters into operation. On the lower tool carriage are the tools for all facing cuts; this too has an axial movement of

7 in. and will face any distance up to 3 5/16 in. when the cutter is on center.

The work spindle is 4 1/2 in. in diameter and has a 3 5/8 in. hole; it has the face plate forged integral with it. The machine is adapted for electric motor drive, and when this drive is used, the motor is mounted in the base. Change gears not in use are carried on a door of the base.

Although the lathe is adapted for quite a variety of work in the automotive line, its advantages stand out particularly in connection with the boring and facing of ring gear blanks. The blanks are held in the lathe by means of a three-jaw air chuck. The first operation consists in rough-boring the hole, which is done with a forged tool. As soon as the rough-boring is completed, the finish-boring cut begins, an inserted tool being used for this cut. These two tools are carried by the upper tool-head.

The lower tool-head carries eight tools, four for rough facing, one for chamfering and three for finish facing. Two cutters are used for rough facing the back face of the gear ring, one starting from the outside and the other at the same time from the inside, or from the hole. The third roughing tool roughs out the recess and the fourth the inner face of the ring flange. These four tools therefore rough three surfaces and all of these surfaces are finished on the return motion of the tool-head. As the feed of the tool-head reverses, the spindle speed is automatically increased so as to provide greater cutting speed during the finish cut. The machining time on such ring gears varies from three to six minutes, according to size, amount of stock to be removed and hardness of metal. The ring gear of a popular make of six-cylinder car, which measures 10 3/4 in. in diameter, can be put through this operation at the rate of twenty per hour.

From the above outline of the operation on the Hartness lathe it will be seen that only the boring and the facing of surfaces perpendicular to the axis are accomplished in this machine. The remaining surfaces, that is, the face and both ends of the toothed portion of the ring, are machined in the Fay automatic lathe, a number of chamfering and rounding cuts being taken at the same time. The ring gear is again held in the lathe by means of an air-operated fixture, this time with the

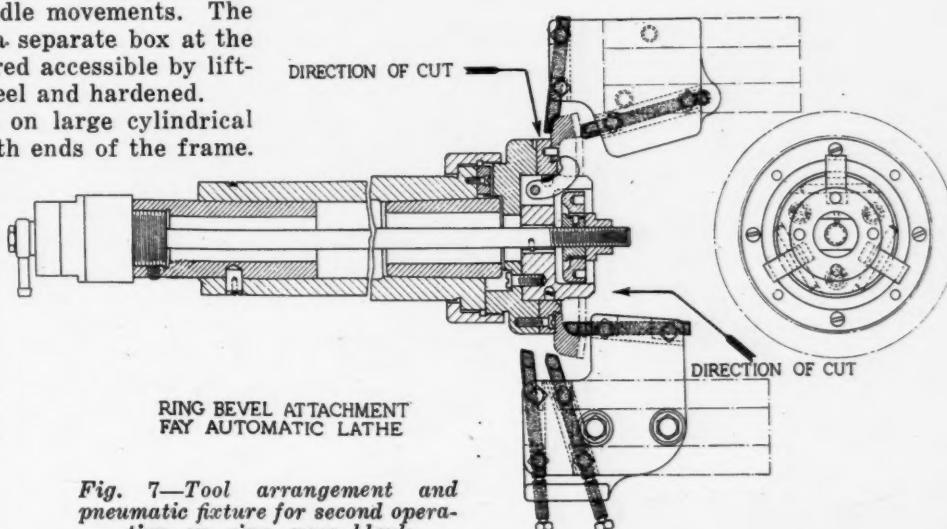


Fig. 7—Tool arrangement and pneumatic fixture for second operation on ring gear blank

toothed side away from the chuck, as shown in the illustration (Fig. 7). It is located either by the bored hole or the counterbore finished in the previous operation, and is held against the back face by pawls or fingers which grip on the surface that was back-faced in the first operation on the Hartness lathe. The work done on the Fay lathe consists in roughing and finishing the outside and the face angle and boring the inner edge of the teeth. The tool arrangement is shown in Fig. 7. One tool roughs the outside and another finishes this surface after the first tool is across. The same carriage which carries these tools also has a tool for boring the inner edge of the teeth; it finishes this surface in one cut from the rough and starts cutting immediately the turning of the outside has been completed. The long face angle is rough-faced by a tool mounted on the back arm and is finish-faced by a tool mounted in the overhead slide (see Fig. 5). The back arm also carries a tool for turning the radius at the back of the gear. *Fig. 9—Tool arrangement for machining outside of differential case in Hartness lathe*

Owing to the rigidity of the machine, the degree of accuracy demanded in automobile ring gears is secured even though roughing and finishing cuts are taken at the same time. Taking roughing and finishing cuts simultaneously of course greatly increases the rate of production. All the operations described can be performed in practically the same time it takes for a roughing cut across the long front face, and the largest sizes of automobile ring gears are put through at the rate of 12 to 15 per hour.

Fig. 5 shows one of these ring gears held in position by an air-operated fixture of the type shown in detail in Fig. 7. Hand-operated devices are sometimes used for

TOOL SETTING FOR DIFFERENTIAL CASES
ON 8 X 6 HARTNESS AUTOMATIC LATHE
1ST OPERATION

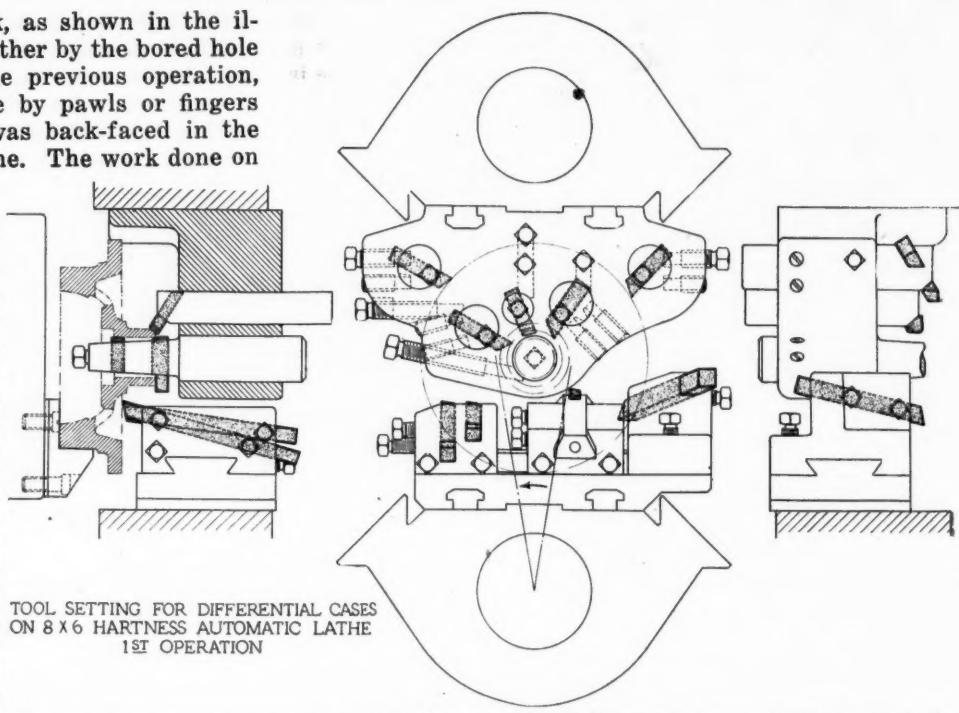
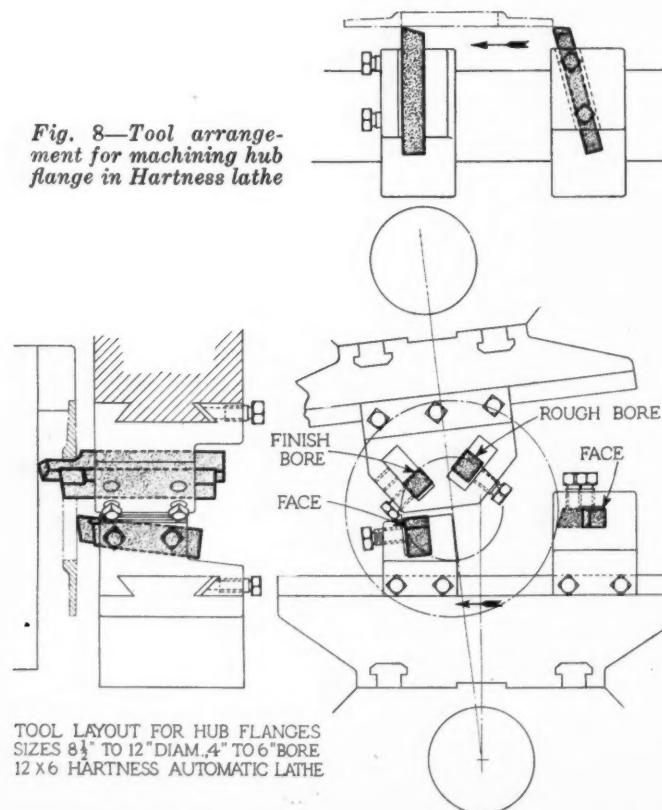


Fig. 8—Tool arrangement for machining hub flange in Hartness lathe



holding the rings, but are, of course, slower. The advantage of the Fay automatic lathe for this work lies in the fact that in addition to taking all of the cuts at the same time, the machine goes through all its motions automatically, the only work the operator has to do being to put the work into the machine and pulling down the starting lever. One man runs two machines on practically all work, and the idle work of the machine is very slight. The direction of motion of both carriage and back arm is controlled by the proper setting for formers and cams.

Another piece of work in the automotive line that can be done to advantage on the new Hartness automatic lathe is the turning of hub flanges. This is illustrated in Fig. 8. Two tools carried by the upper tool-head rough and finish bore the hole and two tools carried by the lower tool-head face the inner side, starting from the outer and inner edges simultaneously. Roller bearing outer races of large diameter can also be handled in this lathe. The race or ring is held in swivel jaws so that it is gripped at six equi-distant points on its circumference and distortion due to the clamping pressure is held down to a minimum. The upper tool-head carries a taper slide which bores the taper hole. The lower tool-head carries the cutters for facing the front and back faces and for chamfering the corners. In the next operation the piece is held on a taper arbor by air pressure. The upper tool-head first rough-turns the outside and then swings slightly to bring the finishing cutter into position and feeds away from the chuck on the finishing cut. Cutters for rounding both outside corners are carried by the lower tool-head.

Another operation to which the machine is adapted is the machining of differential casings (see Fig. 9). In the first or outside operation the flange is rough and finish-turned, the hub turned (two cuts), the flange faced, the hub faced and the hole bored. How the work is divided between tools carried by the upper and lower tool-head may be seen from the illustration.

The differential gear is a part that does not vary much on different cars, and its housing is ordinarily a difficult part to machine, owing to the many surfaces to be finished. Lay-out here shown makes this a simple operation.

The True Function of an Employees' Lunch Room

It doesn't cost anything to think, and an excellent opportunity for making plans is presented when production does not demand intensive effort for the time being. The real function of the employees' cafeteria is not always determined beforehand. The subject is worth serious consideration.

By Norman G. Shidle

ASUMMER visitor to a rural town became interested in an old rustic who seemed to spend his entire existence sitting on the cracker barrel at the village store. Finally the visitor approached the native one day and asked curiously:

"What do you do here all day long?"

"Well," the old man replied, "mostly I sit and think; sometimes I just sit."

When sales slump off and the intensive drive for production has temporarily become unnecessary, an excellent opportunity is presented to sit and think—and a dangerous opportunity to "just sit." While the present time may not be favorable to the development of new phases of manufacturing efficiency, it is very favorable for considering carefully the lines along which such developments should go, for determining how weak points in the organization may be strengthened and how former mistakes and deficiencies may be corrected.

The function of the factory lunch room or cafeteria, its usefulness and its relative production importance is one factor which may well be considered during these days when there is time to "sit and think."

The employees' lunch room has ancestors a few generations back which often cause its real function to be mistaken. One of those ancestors was the hot coffee and doughnuts which comprised the beginning of "welfare work." This ancestor proved to be a fraud in many cases, acting chiefly as a substitute for fair wages and decent working conditions. Those days, of course, are long since passed. The philanthropic ideals which dominated even the most honestly conceived "welfare work" are no longer being considered with favor.

And the factory cafeteria or lunch room is shaking itself free from the unfortunate association with its "philanthropic" ancestors.

That association is rightly called unfortunate, because the factory lunch room cannot attain its highest effectiveness either from the standpoint of the employer who installs it or of the employee who utilizes it unless conceived and operated on a self-respecting and business-like basis.

In most modern industrial plants the employees' lunch room has a place. Some of the chief reasons for this are:

1. Frequently there are not adequate eating accommodations adjacent to the plant. In many cases it would be impossible for the worker to get any lunch unless he carried it from home.

2. The luncheon hour should be a period of relaxation, if the man is to start his afternoon's work with renewed interest and energy. This is impossible if he must crowd himself into some small ill-ventilated lunch room, where neither the surroundings nor the atmosphere invite him to remain for a moment longer than is necessary to eat his food as rapidly as possible.
3. Nearly all public lunch rooms near to manufacturing plants are of this kind. Clean, inviting lunch rooms will not accept the patronage of men in dirty overalls and greasy clothes. Men do not eat in dirty lunch rooms from preference. Such eating places have a decidedly bad psychological as well as physical effect, the results of which accrue to production in the afternoon.
4. The cold lunch is often the only alternative to these public lunch rooms. The ill-effects of constant cold-lunch eating have been so widely and effectively discussed as to need no repetition here.

Consequently, the employer gains a definite advantage from providing decent eating facilities for his employees. So well-known an authority as Daniel Bloomfield states that "to make such provision even at an immediate financial loss, involves no philanthropy." This is doubtless true, but there is really no reason to operate an employees' lunch room at a loss. While it would not be good policy for the employer to attempt to make his lunch room a source of profit, there is every reason for him to charge a fair price for the food served, so that the lunch room will pay for itself.

The object of the employees' lunch room is not to gain the men's good will by giving them a daily present, it is merely to provide them with the opportunity to buy at a fair price that comfort and nourishment for which they are willing and able to pay. We all like to get things as cheaply as possible, but we are better satisfied when we pay for them at a fair price than when they are given to us by someone for whom we are working.

When the lunch room is operated on a self-supporting basis there is no chance for suspicion to arise on the part of the workman that the employer is giving him something at noon hour and taking away twice as much during working hours. No employer does that to-day, of course, but facts are not necessary to arouse suspicion. Letting the workman pay his way leaves him with a feeling of independence and self-respect—and this feeling is the charm which wards off the ghosts of the cafeteria's ancestors. It is impossible to study human relationships in industry and not come to believing in ghosts; they are often very real.

The lunch room will do more than aid the digestion and physical well-being of the workers. It will, of course, do these things. The production advantages of such aid have been discussed and written about at great length—probably with too much enthusiasm at times. Nevertheless, it is certainly true that better work will come from employees who have an opportunity to eat a decent warm meal at noontime.

But the clean atmosphere and surroundings of a well-equipped cafeteria provide for the manual workmen that relaxation and opportunity for social intercourse which most executives enjoy so much. Office workers usually look to the noon hour as a time for "talking things over," for enjoying the company of their fellow workers and for having a pleasant relaxation from their work. They all eat, it is true, but the psychological features play fully as important a part as the physical appetite. We all know the effect it has on us. The clean, pleasant cafeteria has the same effect upon the manual workmen. Strangely enough, most of his reactions are just like ours.

Having determined that a well-conducted cafeteria is a benefit to all concerned, careful attention should be given to choosing and installing the proper equipment. To accomplish the objects in view, adequate service should be provided at the lowest possible cost—but the service must be adequate.

It is possible by means of a cafeteria system to serve a large number of people in a very short time, and such a system is often desirable in the employees' lunch room. An example of good service in this respect is to be found at the big cafeteria of the Westinghouse Electric Company. Although this installation is much larger than would be necessary in a majority of plants, its operation illustrates the best modern practice and has been adapted elsewhere on a smaller scale.

In this particular case an entire building is devoted to cafeteria purposes, the first floor being divided into separate sections for men and women. The second floor is one large cafeteria for both men and women.

The employees enter the building at the center and proceed up an incline or ramp to the second floor. Thence they go to the section of the cafeteria nearest them. After eating, they depart from the building at either end down other ramps. Thus there is a continuous circulation of employees in and out through different entrances. Some such system as this is desirable in any factory lunch room, as it eliminates crowding and confusion.

A belt conveyor has been installed here upon which the employee places his tray as he goes down the line selecting his food. He picks up his tray and silverware, as in an ordinary cafeteria, but instead of carrying or pushing it, he places it on this moving belt. Thus the tray moves along, the employee following it. This prevents the line being delayed, since all the food is laid out on the plates in advance and it is necessary simply to pick one up and place it on the tray as the tray moves along. This arrangement permits the serving of 34 persons a minute by each service counter.

Since this moving belt idea was an innovation, the employees were just a bit afraid of it at first. To overcome this difficulty, cafeteria attendants were stationed at each end of the line to shut off the belt motor in case a jam should develop. The employees quickly found that if the tray moved along a trifle too fast they could hold it in place on the belt while they were getting what they wanted.

After the employee has finished eating he picks up his tray and carries it to another moving belt by which the tray is carried to an automatic elevator, which in

turn takes it to the dishwashing room. This belt conveyor system is one of the chief features of this particular installation. This Westinghouse installation was made by Albert Pick & Company and contains many other details of efficient cafeteria practice in connection with the preparation and serving of food, dishwashing, etc.

The best results in a special instance, however, can be obtained only by providing equipment especially adapted to the needs of the particular plant. The instance cited merely shows the advantages which can be gained from thorough study and planning. Excellent advice along these lines can usually be obtained from the companies which specialize in lunch room equipment and installations, and the manufacturer may as well take advantage of the service which these firms have built up for his benefit.

One phase of employees' restaurant operations that should not be overlooked is that which concerns the serving of food which will be in accord with the religious, as well as the physical attributes of those who are to consume it. The menu should always be so arranged that there will be sufficient variety to give a full meal to every man every day regardless of his religious affiliation. There should never be a day, for instance, when pork is the only meat served, nor should fish of some kind be omitted from the Friday bill-of-fare. In a plant which employs a large number of foreign workers, the menu should be such as to allow for the various fast days or religious observances of the different groups.

In plants where there is any kind of employee association, it is well for a restaurant committee to be appointed from that group.

In smaller plants, a regular lunch room with waitresses and table service has often been found to be effective. In any case, the eating place and its service should embody the following essentials:

1. Cleanliness.
2. Fresh air and good light.
3. Rapid service.
4. Good food at cost price.
5. An orderly method of entering and leaving the eating place.
6. As much quiet as is consistent with efficient service.

Many times the company lunch room is as desirous from the standpoint of office workers and executives as from the standpoint of the workmen in the shop. In such cases, one of two plans may be followed out:

1. A separate space may be provided for this class of employees.
2. Both executives and workers may eat in the same place.

The first plan is the one most generally followed and has much to commend it. In certain other cases, however, the second system is successful. There is much to be said in favor of the latter system, especially from the standpoint of "democracy," but the best results will probably be obtained in any individual case by doing what the executives honestly feel to be the best in that instance.

It should be noted, however, that eating in a clean place alongside of clean people is likely to make the workmen in general more cleanly in their habits. A well-known machine tool plant in New England about a year ago installed a lunch room for its 500 employees. In this lunch room a regular lunch is served at a fixed price, the food being served to the men by waitresses.

Executives and workmen eat at the same table side by

side. Conversation is perfectly natural, the executives simply act as nature prompts them to act, and there is no resulting loss of dignity; nor is there evidenced any of the false enthusiasm or feigned "good-fellowship" which goes with excessive or forced geniality.

In this instance the personal cleanliness of the workers at lunch-hour is very noticeable. Men in very dirty, greasy working clothes come in to lunch with their hands and face thoroughly washed and cleaned. This is true of almost every workman who eats there. Whatever might be the result elsewhere, this condition has come about naturally in this plant, since no effort was made by the management to bring it about.

The president of this company happens to have a very exceptional understanding of human relationships and is one of those perfect gentlemen with whom anyone feels entirely at ease. The executives with whom he has surrounded himself are of the same type. This accounts to a large extent for the success of this "democratic" method of running the lunch room. These men really seem to enjoy eating with the workmen and to be better contented than if they had a separate dining room to themselves.

In many other cases, however, such a plan might be unpleasant for both employees and executives. Nothing is to be gained from attempting to force executives to be what they are not; to eat among workmen as a matter of policy rather than as one of desire. And it must be recognized, of course, that

workmen in various plants differ greatly. Moreover, executives often desire to utilize the lunch hour for business conferences, and thus require a segregated eating place.

Whether or not the office employees' lunch room should be segregated from that of the shop employees is one to be decided chiefly in accordance with the feelings of the executives in charge of the plant.

It is not often that the publicity material of a company with goods to sell can be quoted as reliable information about that product. A good summary of the requirements of a successful factory cafeteria, however, is contained in a booklet recently issued by Albert Pick & Co., and comprises an excellent summary to this discussion.

"Whether a cafeteria pays or is run at a loss depends upon its mode of operation. It has to be carefully planned and properly conducted. It is an important business venture which will run away with itself in expense or fall behind in service if it is not well equipped. It is a restaurant and should be conducted on restaurant principles. It should not be entrusted to the tender mercies of novices or theorists. An expert restaurant man or woman should be placed in charge. The food should be purchased in quantities. A careful check-up system should be provided. There should be sufficient variety. Prices should be based on cost. Waste should be eliminated and the most stringent food conservation policies used. * * *

"Whether the factory be great or small a thoroughly thought-out plan can be put into operation in the way that will meet its requirements best."

Let Everybody In

DISCUSSING what he believed to be the ineffectiveness of certain forms of "welfare" work as carried on in his plant, the vice-president of a large New Jersey automotive concern said recently:

"Take, for example, our baseball team. The team is very successful and wins a large percentage of its games. We employ, however, a large number of foreign-born workmen, many of whom scarcely speak English. These men are not at all interested in baseball and never attend the games. They do not understand it and have no enthusiasm for it.

"So it is with many of the other employee activities which we carry on. These foreigners, who comprise a majority of our employees, are entirely out of them."

This executive brings up an important point which is not often recognized in the organization and operation of employees' service work. The tendency is to organize and promote activities which the personnel director is familiar with and which, as Americans, we feel the foreigner ought to take part in.

A particularly good analysis of this special problem is given by Daniel Bloomfield in his recent book, "Labor Maintenance." Bloomfield says in part:

"It is often noticeable that games, like languages, are something that need to be acquired, and the methods of acquiring them have to be planned with intelligence. The teacher of English does not start by ridiculing the mother tongue of the alien who is to be taught. In the recreation room and on the playground the same tact needs to be employed. Plays and exercises traditional with the alien have often been subjected to disheartening ridicule, with the result of driving him away from play activities.

"He gets the burnt-finger attitude. Such disaffection is a loss to the organization and a handicap to

right relations. The alien is sensitive about his customs and native mode of self-expression, as we should be in the same situation. Wise recreation leadership will see to it that not only does each member of the organization find a place in the activities going forward, but can do so without loss of self-respect or danger of humiliation."

Better Road Construction

THE need for improved roads and a lower cost of operation is becoming more and more apparent. Railroad congestion, brought about by the necessities of war and government control, with the resulting increased use of motor trucks, has made the highway problem a serious one. While intermittent attempts have been made to establish an efficient highway system in the United States, yet it has not been possible until recently for the automotive engineers to meet with the road experts and work out a definite engineering plan of re-establishment and improvement. Many organizations have been at work during the past year on this important problem. Thousands of experiments have been made by government experts, automotive engineers and road builders. Their investigations have revealed startling facts. Borings to a depth of 10 to 15 ft. below the road surface have shown that many of the roads recently constructed are built on an entirely wrong plan. As one engineer expressed it: "You can't lay a road like a carpet over sand and expect it to last, but if you build it like a bridge, it will." The subsoil several feet below the actual bed of the road has been found to have a very important bearing on the lasting qualities of the highway. Many of the pet theories of experienced road builders have been totally exploded, and new methods which on their face looked fanciful have been found to possess real merit.

Road Construction to Build Up the Exports of Automobiles

This is a discussion of the work which should be done by exporters in furthering highway improvements in Latin-America, South Africa, Australia and China, with comments upon the value of graded dirt roads in these developing territories rather than hard-surfaced construction.

By George E. Quisenberry*

TOO little attention has been given by automotive exporters to the furtherance of road and highway improvement work in the foreign field. This statement is readily proved by even the slightest study of road conditions throughout such great stretches of territory as Latin-America, South Africa, Australia, and China where America must look in great measure for the future absorption of the cars, trucks, tractors and equipment it ships into the export markets.

These territories to-day are awake with the idea of road building as they never have been before. In the last few years, they have bought motor cars by the thousands and this has brought about a consciousness of the need for highway improvement that no other agency could have aroused. But the interest—and only here and there has it yet been fused into the actual construction of many miles of good roads—must be quickened so that future expansion may assure the automobile its rightful place in the transportation systems of these growing and developing countries.

In a word, the automotive exporter must get behind the idea of good roads, he must push their construction and, in large measure, he must supply the impetus and the propaganda necessary to transform thought into action. He can do nothing else that will have such a lasting effect upon the industry he represents and be such a potent factor for its rightful development through the coming years.

Let us look at the situation as it exists to-day, taking Latin-America as the example. This is a territory comparatively sparsely settled and devoted almost entirely to agriculture. Great stretches of the Argentine, Uruguay and Southern Brazil, as well as the inland valley of Chile, present no difficulties to the opening up of serviceable highways. Being agricultural, the problems of road development become analogous to those of the farming districts of our own Middle West.

The Argentine is almost as level as a man's hand over three-quarters of its wide expanse. Land has been cheap and broad national highway routes have been laid out in nearly all of the more prosperous territories. Their width, to one who has been used to the roads of this country or Europe, is well nigh astounding, being 80 to 100 ft. or more. Their development has been left to nature and the huge two-wheeled carts of which the automotive exporters have heard so much. The result has been the natural one that such highways are often impassable and that long distance touring is attended with perplexing difficulties.

The testimony of a recent traveler, representing an American tire maker, who traveled all over the Argentine in an American automobile, is illuminating.

"Good dirt roads for light traffic are not difficult to build here," he says. "It was noticeable on the road from Buenos Aires to Cordoba that wherever there was ditching and even a small amount of grading, there was no trouble in passing. What work was done, however, was done with the pick and shovel. Road machines, which might clear up a dirt road very quickly, have not penetrated to the Argentine. If motor owners and those in the sale of motors and road machinery makers would get together, they could do much to get the work of road making under way."

Road builders agree that the problems of highway building are centered in overcoming water and frost. In other words, drainage and freezing weather. For the Argentine, the latter may be forgotten, as it may for most of those parts of Latin-America which concern the exporter of automotive equipment.

Get rid of the water and the good road has become a reality. Apply this to the Argentine, to Uruguay, to Brazil, to Mexico, to interior Chile, and see what the result will be in future expansion of the motor car.

The proper construction for these countries is that known as the graded dirt road. The roadway is graded above the water, ditched for proper drainage, and crowned so that rain will quickly run off to the sides. This is the same road, easily and quickly built and with slight expense, that carries the great traffic in motor cars through Missouri, Kansas, Nebraska, Illinois, Ohio and the other grain growing states. They are constructed with a small amount of mechanical equipment, present almost no engineering problems and can be maintained with the home-made drag. Furthermore, they are almost year-around roads.

Latin-America is thinking to-day almost entirely of hard-surfacing its roads. This is so despite the high cost and physical difficulties, such, for instance, as in the Argentine where stone is obtained only after long rail or water shipment. In fact, one authority whose insight cannot be doubted declares that the first movement in any road campaign in South America is to overcome the desire for hard-surfaced highways. The graded earth road is much more suitable for a sparsely settled territory where land holdings are generally large and roads of this kind can be obtained in a fraction of the time that would be required to finance and build with macadam or concrete.

The duty of the automotive exporter is to further this propaganda and to aid in every manner possible in put-

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ting it across. Passable roads, improved for traffic, must be cut through from town to town and existing roads must be graded and drained so that they will permit passage of cars and light trucks during the greater part of the year. No agency is so well prepared to assist in such campaigns as the automotive exporter and manufacturer. To them should fall a great deal of the preparatory work, just as it has here.

In recent weeks, communications on this subject have been received from Mexico, Peru, Chile, the Argentine and Brazil. Each of these countries is seeking light as to how it may pull itself out of the mud. Automobile and road associations have been formed or are in process of organization to further the work and each is sincerely desirous of getting better highways.

In Chile, the automobile club of Valparaiso is working upon the road between that city and Santiago, the capital, a stretch of some 150 kilometers that, once opened, will be dotted with motor cars speeding between the two chief centers. From Puerto Montt, far to the south in the same country, comes a similar word that improvements are under way. From Lima, Peru, the sentiment is expressed that road work is of prime necessity and elsewhere on the west and the east coast the same may be heard.

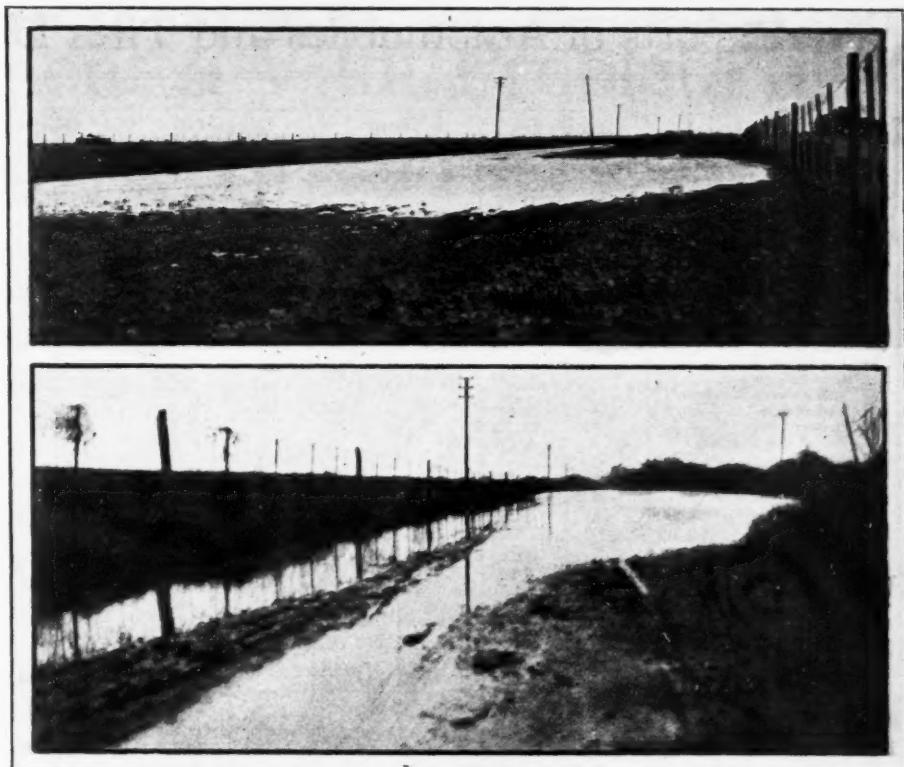
In São Paulo, Brazil, notable work already has been accomplished in getting highways built by co-operative effort. Uruguay has probably a better mileage of good roads than any other country in South America and, in Argentina, success has attended those efforts which have been made to grade up the earth roads and to maintain them either by governmental or co-operative effort of the estanciero owners. Frequent testimony is heard to the effect that many roads in the Argentine require grading or improvement in only a few stretches to make them suitable for many miles of travel.

In Latin-America, as in Australia and South Africa, there are many motor clubs and, in some cities, associations of automobile dealers. They are potent factors in getting road activities under way and, with them, the automotive exporters should work in close union. As an example of what such clubs may do, the Jalisco Automobile Club of Guadalajara, Mexico, might be cited. It has gotten behind several road projects. One of the latest such projects in the Guadalajara district is the road from that city to Colonia Seate, which was formally opened on Dec. 1, 1920.

Latin-America is close at hand and from it may be gained the road lessons that should be applied in all those developing countries of the world. Conditions are the same in each and the reward for work accomplished will be similar.

This article cannot be completed without a word about China and its future road activities. The Celestial Kingdom, it cannot be doubted, is at the doorway of much building. Of that there is every testimony:

"Just at present, there is more interest being shown in good roads in China than has been manifested in centuries; yet they know little or nothing about it," says a recent letter from Shanghai. "A good roads movement



Improper drainage has made these Argentine roads almost impassable. To grade them above the water is a task requiring but little mechanical equipment and time

would mean millions to the exporters and they should get behind it."

Coincident with this, is the announcement of the Bureau of Foreign and Domestic Commerce that a road making convention and exhibition of road constructing machinery will be held at Shanghai in May of this year under the auspices of the roads committee of the Pan Pacific Association. Two main roads, the bureau adds, are under contemplation for construction, one from Shanghai to Hangchow, the other Shanghai to Nanking.

THE use of radio communication, both telegraph and telephone, on the military airplane is, perhaps, the latest application of radio science, increasing tenfold the usefulness of the airplane and already influencing the design of military aircraft. The dots and dashes of the Morse code transmitted from the trailing aerial of the airplane carry to the ears of the artillery battery commander the correction for each shot fired, enabling him to group his hits on an invisible target with a degree of accuracy as great as is possible when the target can be seen, or bring to a waiting general news of enemy troop movement observed from the air.

Squadrons of attacking planes can be maneuvered in flight by means of the wireless telephone from the airplane of the squadron commander or from the ground as easily as a company of infantry is handled. By the same means machines engaged in aerial combat and outnumbered may call for assistance.

Bombing planes lost in the fog or darkness are directed unerringly to the home airdrome by the radio direction finder and airplanes without pilots, controlled entirely by radio, are already a reality.

The Air Service of the Army, realizing the importance of this newest phase of radio, has established a school for the training of personnel to install, operate and maintain the radio equipment of airplanes at all the flying fields throughout the country.

Exports of Automobiles and Tires for December, 1920

COUNTRIES	COMMERCIAL				PASSENGER				Parts	TIRES			All Other Tires	
	Complete Cars		Chassis		Complete Cars		Chassis			Casings	Inner	Solid		
	Europe	North and South America	Chassis	Chassis	Chassis	Chassis	Chassis	Chassis		Chassis	Chassis	Chassis		
1 Austria	3	\$1,348	.....	.....	11	\$4,627	.....	.....	\$1,538	\$80	\$16	.....	.....
2 Azores and Madeira Is.	25	11,240	.....	.....	49	57,418	30	\$8,910	14,095	152,937	3,662	.....	\$96
3 Belgium	4	9,723	.....	.....	5	2,283	.....	.....	780	.....	.....	156,509	339
4 Bulgaria	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,824	.....
5 Czechoslovakia	.....	.....	2	\$6,471	25	40,402	.....	.....	499,385	17,891	1,526	.....	19,417
6 Denmark	.....	.....	.....	.....	1	1,600	.....	.....	1,873	17,144	2,052	452	19,648
7 Finland	.....	.....	.....	.....	21	33,074	6	4,310	196,843	90,488	26,010	.....	116,498
8 France	1	3,887	.....	.....	8	15,217	.....	.....	1,442	1,613	211	.....	1,824
9 Gibraltar	1	2,800	.....	.....	10	11,155	.....	.....	2,528	.....	.....	.....	.....
10 Greece	5	13,425	1	3,966	48	91,411	.....	.....	14,925	24,372	4,125	.....	28,497
11 Hungary	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12 Iceland and Faroe Is.	1	545	6	2,580	5	8,750	.....	.....	14,255	46,621	9,511	.....	56,132
13 Italy	.....	.....	.....	.....	24	33,292	.....	.....	1,183	.....	.....	.....	.....
14 Malta, Gozo and Cyprus Is.	31	31,301	1	2,000	117	181,472	7	4,935	48,975	140,227	7,296	3,036	150,559	
15 Norway	8	19,500	8	18,100	18	26,460	.....	.....	66,384	61,927	6,297	7,628	75,852
16 Poland and Danzig	1	3,635	.....	.....	11	18,000	.....	.....	8,231	3,503	465	.....	3,968
17 Portugal	.....	1	4,243	6	11,722	1	4,250	9,503	7,683	1,390	.....	9,073	.....
18 Romania	7	5,606	10	7,500	11	7,675	.....	.....	2,180	6,379	2,847	4,734	9,226
19 Russia in Europe	46	25,400	.....	.....	309	477,346	9	16,080	391,156	168,573	8,629	4,620	181,822
20 Spain	23	57,172	16	29,876	117	116,722	7	6,431	78,448	31,067	3,340	.....	34,407
21 Sweden	6	14,311	48	80,666	97	.....	64	78,396	1	800	13,516	3,944	4,438
22 Switzerland	.....	.....	.....	.....	90	71,508	5	13,673	41,336	812	.....	42,148	.....
23 Turkey in Europe	7	3,355	.....	.....	2	5,494	.....	.....	1,681	5,950	32	.....	5,982
24 England	6	7,680	53	86,485	68	123,321	5	4,792	2,685,975	393,203	24,976	36,398	454,577	
25 Scotland	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
26 Ireland	1	1,550	.....	.....	2	1,440	.....	.....	715	.....	.....	.....	.....
114 Yugoslavia, Albania, etc.	.....	.....	.....	.....	.....	.....	.....	70	993	49	.....	1,042	.....
North and South America	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28 Bermuda	.....	.....	.....	.....	.....	.....	.....	190	.....	.....	.....	.....	.....
29 British Honduras	.....	.....	.....	.....	3	2,450	.....	.....	1,755	253	7	.....	260
30 Canada	54	104,555	19	44,419	91	168,886	12	24,793	355,230	270,982	79,454	20,941	371,377	
31 Costa Rica	2	990	.....	.....	18	20,186	.....	.....	2,467	1,219	220	.....	1,439
32 Guatemala	7	7,355	.....	.....	8	15,834	.....	.....	3,343	1,396	50	.....	1,446
33 Honduras	.....	.....	.....	.....	15	12,504	1	379	4,948	1,547	10	.....	1,557
34 Nicaragua	1	3,426	1	2,540	13	16,703	.....	.....	6,582	1,806	816	.....	2,622
35 Panama	4	1,980	.....	.....	52	65,700	.....	.....	21,496	16,919	1,732	6,580	25,211
36 Salvador	5	20,236	5	19,981	23	35,948	.....	.....	3,185	3,671	6,413	1,918	12,002
37 Greenland	164	235,892	24	52,256	565	512,507	1	734	174,372	122,462	20,901	10,511	153,874	
38 Mexico	.....	.....	.....	.....	9	6,600	.....	.....	1,031	55	7	.....	62
39 Miquelon, Langley, etc.	.....	.....	.....	.....	17	27,034	.....	.....	9,852	2,366	179	.....	2,545
40 Newfoundland and Lab'dor	.....	.....	.....	.....	47	39,980	1	2,357	32,742	43,484	1,975	269	45,728
41 Barbados	25	18,580	2	2,702	39	51,546	1	2,702	27,875	26,272	1,281	4,052	32,485	
42 Jamaica	18	24,832	1	1,875	21	18,693	.....	.....	7,385	3,206	116	177	3,499
43 Trinidad and Tobago	45	46,189	1	2,056	21	42,978	6	16,960	176,737	65,661	12,167	37,906	115,734	
44 Other British West Indies	14	8,599	18	33,333	231	420,987	6	176,737	65,661	12,167	37,906	115,734	.....
45 Cuba	42	86,067	25	33,333	9	1,176	.....	.....	1,978	869	25	.....	894
46 Virgin Islands of U. S.	3	1,810	.....	.....	21	22,332	.....	.....	2,196	2,093	194	.....	2,287
47 Dutch West Indies	8	3,602	.....	.....	20	27,034	.....	.....	9,718	9,594	1,244	4,374	15,212
48 French West Indies	11	6,444	1	2,056	21	19,754	.....	.....	7,504	8,065	1,673	.....	9,738
49 Haiti	1	7,625	.....	.....	21	22,770	.....	.....	30,483	17,589	3,542	3,997	25,128
50 Dominican Republic	37	24,674	9	22,796	43	48,793	10	8,576	966,892	222,477	27,039	750	250,266	
51 Argentina	12	46,875	11	30,753	660	798,044	10	.....	1,432	2,097	31	.....	2,128
52 Bolivia	1	2,800	.....	.....	1,500	1,683	.....	.....	6,288	625,154	128,867	5,096	2,928
53 Brazil	56	32,751	4	7,598	590	691,743	3	.....	50,601	40,668	3,483	178	44,329
54 Chile	97	77,050	6	9,661	101	152,717	4	.....	23,873	9,138	1,145	.....	10,283
55 Colombia	6	2,970	2	4,800	42	72,163	4	.....	5,043	5,246	329	.....	5,575
56 Ecuador	10	5,195	.....	.....	16	32,317	.....	.....	.....	.....	.....	.....	.....
57 Falkland Islands	.....	.....	.....	.....	32	59,593	.....	.....	6,712	8,573	2,336	2,409	13,318
58 British Guiana	25	12,057	3	8,863	25	18,365	.....	.....	11,206	3,791	226	.....	4,017
59 Dutch Guiana	1	600	2	1,150	1	835	.....	.....	3,316	289	.....	.....	289
60 French Guiana	1	3,061	.....	.....	1	1,000	.....	.....	.....	.....	.....	.....	.....
61 Paraguay	20	35,176	.....	.....	75	131,466	.....	.....	1,823	.....	.....	.....	.....
62 Peru	1	1,200	1	1,426	361	411,848	5	3,220	70,602	20,719	4,748	3,365	28,832	
63 Uruguay	35	22,822	.....	.....	75	107,708	.....	.....	104,361	88,861	3,411	92,272	.....
64 Venezuela	.....	.....	.....	.....	.....	.....	.....	.....	26,780	10,345	2,635	98	13,078
Asia and Far East	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
66 Aden	4	12,048	11	46,619	200	249,686	3	5,287	52,723	32,772	6,379	.....	39,151
67 China	.....	.....	.....	.....	5	7,300	.....	.....	2,500	.....	.....	.....	.....
71 Kwantung, leased territory	.....	.....	.....	.....	.....	.....	.....	6,307	.....	.....	.....	.....	.....
72 Chosen	.....	.....	.....	.....	371	507,833	25	30,725	198,629	61,749	6,054	170	67,973
73 British India	64	149,184	14	42,602	56	90,197	3	4,682	100,752	3,338	81	3,327	6,746	
74 Straits Settlements	14	24,302	2	91,612	43	67,103	3	15,469	11,120	343	.....	1,463	.....
75 Other British East Indies	75	3,914	44	130,024	440	649,057	3	3,923	190,677	36,632	5,090	47,690	89,412	
76 Dutch East Indies	169	404,062	8	3,877	24	22,369	9	9,862	.....	.....	98	98	98
77 French East Indies	.....	.....	.....	.....	32	59,593	.....	.....	6,712	8,573	2,336	2,409	13,318
78 Portuguese East Indies	.....	.....	.....	.....	36	14,658	2	600	15,745	2,523	880	.....	3,403
79 Hongkong	.....	.....	.....	.....	9	14,658	2	600	15,745	2,523	880	.....	3,403
80 Japan	43	63,102	31	68,977	124	160,613	60	71,409	74,110	28,711	596	2,100	31,407	
81 Persia	.....	.....	.....	.....	36	38,662	2	600	15,745	2,523	880	.....	3,403
82 Russia in Asia	.....	.....	.....	.....	9	14,658	2	600	15,745	2,523	880	.....	3,403
83 Siam	.....	.....	.....	.....	36	38,662	2	600	15,745	2,523	880	.....	3,403
8														

Unemployment a Vital Problem in Great Britain

Unemployment always constitutes an important phase of the British labor problem. Now it is acute, and must be definitely met if serious consequences are not to ensue. Mr. Tipper explains certain phases of the problem necessary to an understanding of Mr. Northcott's article, following.

By Harry Tipper

NOTHING could better illustrate the difference between the conditions which exist in Great Britain and those obtaining in this country than the approach to the question of employment. The subject is an old one and one of those which has been discussed from all sides a great many times. In this country it has not assumed important dimensions except for very brief periods, whereas in Great Britain unemployment has been a serious problem for many years.

The spectre of starvation has been very close to a considerable percentage of the people at all times in that country, and the fear which is caused by the constant battle with actual hunger is very much more firmly implanted in the rank and file of the workers. Some time before the war outdoor relief, almshouse population and pauperism had reached as high as 26 per cent in some years, and for many years the problem has been a severe one. No one familiar with the industrial conditions in Great Britain in the last twenty-five years could eliminate from his experience the knowledge of the economic conditions of a considerable proportion of the workers in some of the large cities.

One of my friends whose father was a miner in Scotland told me how the family was brought up by the ingenuity of the mother on a wage which never grew larger than \$3 per week. It is a good many years since the volume of trade secured by Great Britain has been so continuously equal to the manufacturing capacity that the whole of the working population was permanently employed.

As a consequence, for twenty years at least, before the war, a percentage of the population was out of work at all times and the government relief, charitable work and so forth, were continuously employed in providing at least a measure of food and shelter to these people.

THREE came into my hands recently the house organ of the Dennison Manufacturing Company of Framingham, Mass., in the December issue of which were printed the articles governing the control and use of the Unemployment Fund set up by this firm. No information was available as to the formation and nature of the fund, but the paragraphs printed showed that the firm had in mind both the prevention and relief of unemployment. The committee in charge of the fund was commissioned to "study methods of preventing and relieving unemployment." The chief method cited for preventing unemployment was that of transferring an employee for whom there was no work to another part of

This condition explains a great deal in the following article, which would be without point otherwise. It will serve to illuminate the government unemployment insurance and the demand for greater security against unemployment on the part of labor. It will indicate also the reason for the "ca'canny" attitude of the labor unions in connection with production. It is significant that this Scottish term, originating in the poorest part of Great Britain, has become a part of the terminology wherever trade unions exist. Where a certain percentage of the workers, even the skilled workers, were unable to find permanent employment, it was obvious that they stretched out to the utmost whatever jobs they secured. No man who was constantly in fear of starvation for himself and his family would do otherwise.

This whole problem of unemployment indicates the growth of industrial difficulties in a country where the agricultural occupation has become entirely subsidiary and the manufacturing capacity has grown far beyond the capacity for absorption in the country itself.

This article is interesting from another standpoint. It indicates the considerations involved in a country where the workers are thoroughly organized and the attitude of those workers to the question of profits upon capital and the position of government in relation to industrial affairs.

The bitterness of the workers' struggle for a decent living and a larger amount of comfort in Great Britain has colored the whole development of the trade union and has affected the whole body of public opinion in regard to the national aspect of industrial problems.

This comment is necessary to an understanding of the significance of the following material prepared by our English correspondent, Clarence H. Northcott.

the plant where there was work. It was stipulated, further, that the principle of "last to come, first to go" should apply to such transfers or to any "layoffs." The most interesting part of the scheme is the extent of unemployment compensation. While the condition of the fund permits, it is expected that compensation for employees without dependents shall reach 60 per cent of regular rates, and for employees with dependents 80 per cent. To ascertain regular rates, the average earnings of the previous six weeks will be calculated. While no minimum sums are mentioned, the committee are empowered from time to time to establish such for men and women, with and without dependents respectively.

and to pay these sums whenever they exceed the regular percentage compensation. This compensation is payable for all unemployment in excess of one pay roll day, including holidays per pay week, and two pay roll days excluding holidays, in any four weeks, but will not cover any lay-offs of less than a half day at any time. The rates, however, are subject to reconsideration after payment has been made for six consecutive days.

A noteworthy and rather unique feature of the fund is the provision for compensation to employees transferred or those who have secured work outside the factory. In these cases it seems the desire of the firm that such men and women should receive up to 90 per cent of their regular wage rate with the company. The same provision applies to a man transferred to another department. If, however, such transfer is made, not to avoid unemployment but to retain the services of a valued employee, the compensation is to be debited to the operating expense of the company, not to the unemployment fund.

This pronouncement is of great interest to employers in Great Britain to-day. The wave of depression which passed over Japan and America has reached Europe. In Great Britain unemployment is fairly general, and has touched most trades. Great Britain is so largely an exporting nation that curtailment of buying in such markets as Asia, South America and Europe affects her seriously.

The automobile and engineering trades are feeling the depression acutely. The former was badly hit by the molders' strike at the end of 1919, which interfered greatly with production schedules. In consequence, makers missed last summer's markets.

This reacted on the rubber firms.

At the same time cotton, wool and shoes felt the drop in wholesale prices, the restriction of credit by the banks and the thrift of the consumer who refused to buy at the inflated prices ruling. The slump became serious and the year 1920 closed in industrial gloom.

Unemployment has always been a gaunt demon in Great Britain, but this time he wears a savage as well as a hungry face. Men who fought for years in all quarters of the globe and were always well fed and well clothed while they offered their lives to save their country are not going to accept cold, hunger and starvation tamely. The British worker is no Bolshevik, but he is a stubborn fighter for right, and he has accepted the doctrine that industry owes him maintenance in times of unemployment. He has invested his life and well-being in the industry and holds that his ill-requited labor for it in times of its prosperity shall be balanced by a sustenance wage in bad times. If he cannot get this, which he has come to consider his rights, he seems determined to set up a new form of industry. What it may be, whether syndicalism or guild socialism, he is not clear, but he has convinced the employers of Great Britain that he must receive some decent maintenance during unemployment. Their difficulty is twofold.

First, in very few cases have they worked out a program to meet such an emergency. In the second place, they have not allocated any reserves for this purpose when reserves were abundant, and they are afraid that they cannot find any now for the purpose. As one of them put it, the position they are in is like that of a man seeking an insurance upon his house while one corner of it is a-light.

The government scheme is of little value. It provides that, in return for certain weekly contributions by employers and workers alike, supplemented by the State,

and on fulfillment of certain statutory conditions, men unemployed may receive benefit to the extent of 15s. a week and women 12s. a week. This payment is a mere dole. It is not sufficient to provide food for one individual, without taking account of dependents or of such other necessities as rent and clothing. It is true that most trade unions pay unemployment benefit in return for a small payment from their members. This benefit ranges from 1s. to over 2s. per day, but, as the unions have not large reserves, it cannot be continued for a very long period. The cotton trade unions, who have been paying out since the end of September, have already almost reached the bottom of their treasury. The government benefit, plus that of the unions, is only a small fraction of the normal wage earned. In the industry with which the writer is connected, the minimum time wage for an adult man is 72s. 6d. If unemployed, such a worker would receive only 21s. from state and trade union, that is, about 30 per cent of his regular rate.

An endeavor to find a better scheme that would apply to every industry has been made recently by a group of employers and representatives of labor, who have published their scheme anonymously. The writer, who is acquainted with the employers concerned, can guarantee that they represent big, progressive businesses and bear names known on both sides of the Atlantic. In their discussions they have been assisted by financiers, economists and statisticians, and have consulted freely with all schools of labor.

The opening paragraph of their scheme is one which bears quotation, as showing the economic motive behind such a piece of constructive work:

"The suffering caused by unemployment has been generally recognized, but too little attention has been paid to its reactions on production. Industry moves in a vicious circle. Additional production is necessary if poverty is to be abolished and unemployment relieved. Yet uninformed labor instinctively resists every kind of productive improvement lest it should cause unemployment. Improvements in machinery, in the reorganization of labor with a view to using more effectively skilled grades by means of dilution and in other ways, the introduction of systems of payment by results which have been proved to stimulate production, are all resisted more or less openly, and in every case fear of unemployment is largely responsible for the resistance. It is true that the fear may be largely unjustified, and that 'ca'canny' may accentuate the very evil it is intended to prevent. But such facts are irrelevant. The rank and file of labor believe that improvements bring unemployment and no one has ever succeeded in convincing them that they are wrong. Nor is it any use to argue and make agreements with the leaders of labor; it is the instinctive action of the rank and file that counts. An immense potential increase in the productivity of industry awaits release, and only the complete removal of the menace of unemployment can release it."

As this quotation shows, these employers believe that the future efficiency of British industry depends on giving reasonable security to the worker. They are not satisfied with the government scheme, since the benefits are not sufficient to keep a household together, hence cannot remove "the fear of unemployment or the industrial policy to which this fear gives rise among the workers." Yet, relying on the British preference for governmental action in such matters of social relief, they demand that the State should undertake to deal with this problem on effective and permanent lines, admitting the claim of all adult wage-earners, who are willing and

capable of work, to either suitable employment or adequate maintenance throughout their working lives.

Their proposals are for the creation of a fund which would be sufficient to pay certain benefits. A single person should receive in unemployment compensation 50 per cent of average earnings, with 10 per cent additional for a dependent wife, and 5 per cent for each of not more than three dependent children under 16 years, with a maximum of £5 a week.

Benefits would be payable after three days' unemployment, and should aggregate not more than one week for every six weekly contributions made by the worker, but might extend to 26 weeks. The workers' contribution to this fund is placed at one penny in every 10s. of his wage, that is, a little less than 1 per cent per week. The State is to contribute £4,000,000 and pay the cost of administration, and what more is needed to pay the benefits above sketched, it is suggested, shall be raised by a levy on employers. Their total is estimated on present wage rates at £37,000,000. The promoters calculate that if such a scheme resulted in a 10 per cent increase in production, this would equal 100 millions, or nearly twice the total estimated cost of the scheme. By reason of the psychology of the British worker, such an increase is by no means fantastical. It should be added that the scheme is equally applicable to short time, that is, to work less than the normal working week.

This suggested scheme has been followed promptly by a concrete modification of it in the case of Messrs. Rowntree & Co., cocoa and chocolate manufacturers, who have been pioneers in much social and ameliorative work. Their project went into operation on Jan. 1, 1921, and was drafted in the light of the firm's position, financial and industrial. It applies to all of their workers between the ages of 20 and pension age (65 years) who have been discharged solely through depression of trade, and who, immediately prior to their discharge, had been in the employ of the company continuously for six months. Benefit will take account of length of service, being at the rate of one week for each two months of service up to 2½ years, and one week for each complete year beyond that period. That is, an employee who had been with the company 2½ years would receive benefit from them for the same period as the State grants it.

It is expected by the company that benefits shall total the percentages suggested in the employers' scheme set forth in preceding paragraphs. In addition to the percentages and maximum there set forth, Rowntree & Co. stipulate for a maximum payment of 25s. a week. In these percentage totals are counted the benefits paid by the State and the trade unions. As the largest trade union in their works, which covers in its membership 95 per cent of the unskilled men eligible and 50 per cent of the women, pays 6s. a week, this sum is added to the 15s. paid by the State, and the firm undertakes to pay the residuary cost. Thus, if a single man, without dependents, earning on an average 80s. a week, is discharged through shortage of work, he receives, unless otherwise disqualified, 15s. from the State, 6s. from the trade union and 19s. from Rowntree & Co., bringing his total benefit up to 40s., or 50 per cent of his wage. If the unemployed man is a pieceworker, earning on an average 92s. a week, and has a wife and three dependent children, then in addition to the State and trade union benefits as above, he receives 48s. from Rowntree & Co., making 69s., or 75 per cent of his average earnings, which are calculated on the basis of the preceding quarter.

To meet these obligations, the firm has set aside an initial reserve of £10,000, to which it will add each year

from 1921 onward a sum equal to 1 per cent of its wage bill, until the fund reaches £50,000, or 5 per cent of the wage bill, whichever is the greater. Thereafter it will set aside annually such sums, not exceeding 1 per cent of the wage bill, as will keep the fund up to the maximum aimed at.

It is proposed to apply the provisions of this scheme to partial unemployment or short time, but not until 10 per cent of normal full time has been lost by a time worker and 15 per cent by a pieceworker. Time so lost in excess of 10 per cent or 15 per cent respectively will be paid for at a rate proportionate to full unemployment benefit.

It should be added that this scheme was drawn up by the directors of the company and their social and economic advisers, with active assistance from five delegates from the Central Works Council, whose co-operation was requested. The names of those who are about to be dismissed owing to shortage of work are submitted to the shop stewards of each department. In general, men who are bad time keepers or are inefficient are those selected for dismissal, while others are put onto short time. This action is the choice of the workers, who are consequently interested in the right selection of the "slackers." It is true there have been cases where shop stewards have challenged the manager's selection of inefficient, but, on the other hand, when a disgruntled dismissed man voiced his complaint in the local press, two leading shop stewards stoutly defended the firm's action. The fund is to be administered by a committee of nine appointed by the Central Works Council.

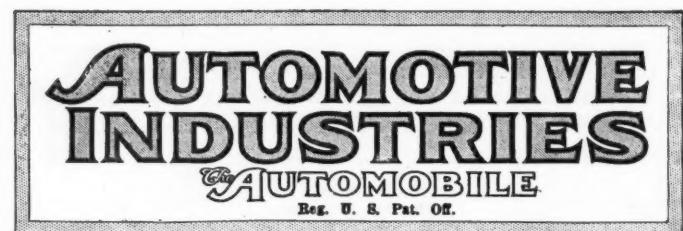
To sum up, the two instances of unemployment relief, that of the Dennison Manufacturing Co. and of Rowntree & Co., point the way to a greater humanizing of industry. They take account of the fears and aspirations of the workers, and by removing the incentive to "ca'cannying," offer the prospect of restoring efficiency, interest and initiative.

They remove the burden from the individual and put it onto the Atlantean shoulders of industry. They show an appreciation of the fact that capital, while enjoying the profits, must take the risks of industry. They are an attempt to regularize industry and rob its cyclical movement of boom and panic of much of its terror to the workers, to whom security will furnish a motive for more intelligent and friendly interest in the productive process.

C. H. NORTHCOTT.

AT a recent meeting of the Royal Aeronautical Society of Great Britain, Lord Mountagu of Beaulieu attempted to make a comparison of the cost of transport by air and by other standard methods. He put the cost of road-motor-transport at from 14 to 20 cents per ton-mile (1d = 2c), of motor-bus and charabances at about 40 cents per ton or 2.5 cents per passenger mile, of railways at 5 cents per ton-mile. The cost of shipping per ton-mile is so low and the ton mileage is so difficult to discover that shipping is treated on the basis of gross tonnage of ship and cargo combined, and varies between 0.076 and 0.144 cents per ton-mile. The cost of passenger traffic per ship-mile varies between 2.22 and 3.6 cents.

For the airplane the author estimates that 88 cents per ton-mile would afford a reasonable profit, and that therefore the airplane can only compete with existing facilities where speed is of great value. The cost of R.34's trip to America is stated to have been \$5.64 per ship-mile. The English-to-India trip with a similar ship is \$9.94 per mile, including interest on capital and cost of running both ship and the necessary bases. With 15 tons available for useful load, this gives 71 cents per ton-mile.



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What Is Normal?

HERE is much discussion to-day of a return to "normal." Just what this means is difficult to say. Does it mean to a standard of business in 1914, 1917 or some other year? Why not take the peak of the first half of 1920 as normal and seek to bring business to that standard? Why should the American business man of to-day walk backwards?

The writer has heard the subject of "getting back to normal" discussed many times recently and invariably some practical man in the group has asked the question that is so obvious. Only a few days ago a sales manager told of declining to answer a questionnaire that was based on "normal" because he did not know what the compiler of the questionnaire had in mind.

The Chamber of Commerce of the United States has just sent to its members a letter of inquiry seeking information as to how business men are "cutting down their operating expenses." In the questions themselves everything is based on the idea that "normal" is less than was the standard of business a few months ago.

One of these questions is especially interesting. It reads:

"What have you done to reduce your publicity costs to a normal basis?"

Frankly we do not believe there is a business man in this country who can answer that question with an assurance that he is right. Several points of doubt arise on first reading. Here are a few:

What is legitimate publicity?

What is a normal cost of publicity?

Is publicity selling the product, or spending money?

If publicity is sales promotion, should it not increase when business is dull?

It would appear to us that it is quite necessary for the Chamber to effect several definitions before considering the replies to this question.

A National Tractor Show

By David Beecroft

HERE is one best place to hold the national tractor show and that is Chicago.

There is one best time to hold it and that is the week of the Chicago Motor Car Show, or the week following it. The week of the motor car show would be best if ample hotel accommodations can be had in Chicago hotels.

We have seen national tractor shows in Kansas City and Columbus, which have been truly national so far as exhibits and display of tractors and farm power equipment and parts are concerned, but we must stop here.

These shows were not national from the attendance point of view.

The Columbus show this year was anything but national in attendance. The dealers were largely from Ohio and adjacent states. True there were some from distant points but in numbers so small as to be insignificant.

It is impossible to hold a national tractor show dependent upon a farmer attendance. The country is too large for that. Upwards of 75 per cent of the Columbus show attendance was farmers and of these 95 per cent were from Ohio. The Columbus show was just a local show from the attendance viewpoint.

No attempt should be made to stage a national consumer tractor show.

The national tractor show must be for distributors and dealers. Chicago is the logical and geographical center for such a show. To get the distributors the week of the Chicago motor car show is best. That week is best not only for distributors but for parts and accessory manufacturers.

At the recent Columbus show our analysis of exhibitors shows 52 tractor makers, 78 makers of parts or accessories for tractors, and 49 makers of farm equipment to 80 tractors for farm use.

A majority of the parts makers have participated in tractor shows for several years, due to the industry being in the formative state. These same makers supported the national motor car shows in New York City and Chicago in the formative days of the motor car, but many years ago withdrew. To-day they maintain headquarters in hotels in New York City or

Chicago during show weeks and accomplish their end. It is expected that history will repeat itself and they will soon withdraw from tractor shows as active exhibitors. There is little for any of them in consumer or dealer attendance. It is true they add to the magnitude of the exposition, but not so much as many think to the real motif of the exposition.

Were the tractor show held in Chicago during motor car show week, these parts makers could meet the tractor industry just as to-day they meet the car and truck industry. Their expenses would be proportionately reduced and the tractor show would not be robbed of much, if any, of its tangible value.

The Columbus tractor show display housed in seven buildings was a most impressive one. Each tractor exhibitor had ample display space, but it would have been a better show if many parts makers had not been present and their space given to tractor and equipment makers and the exhibitors housed in three instead of seven buildings. The show was too scattered.

The tractor manufacturers are looking for dealers and distributors, and will continue to look for them. The imperative problem of better tractor service will result in a heavy annual change in dealers for some years to come. Many distributors voiced this sentiment at the Columbus show. To meet this situation the national tractor show must for years be a dealer and distributor show. It must be a national show located in a center that has national significance, a national appeal to the 48 states, because the tractor, whether used on a farm or in industry, is and will each year become more truly national in use, in distribution, and consequently in service. Chicago has a national appeal as strong as if not stronger than New York City.

Chicago has exhibit spaces suitable in either the Dexter Park Pavilion in the Union Stock Yards, where the National Live Stock Exposition is held annually, or in the new Municipal Pier on the lake front. The very name of Chicago gives an international appeal, and as we must have export trade and sell to the 100 nations of the world, so we must have our national exposition located in centers of international appeal and character—Chicago will draw immeasurably better than Kansas City, Columbus, Minneapolis, St. Louis, Cincinnati, Cleveland, Detroit, or other smaller cities.

The show should be staged directly by the National Implement and Vehicle Association and not by any local tractor club, just as a score of other national industrial shows are staged by the manufacturers constituting these industries and not by the distributors and brokers merchandising the products. Such a show will not interfere with regional tractor shows.

On Trial

PERSONNEL management is on trial. During times of labor shortage and good profits it flourished in nearly every industrial plant. Huge sums were expended on personnel departments of one kind and another. Strong claims were made in its behalf as a vital factor in production and in modern indus-

trial organization. In many cases these claims were fulfilled; in many others they were not.

The personnel department has before it to-day just as difficult and pressing problems as it had a year ago. The difficulty of the labor situation has temporarily abated, but wrong methods at this time on the part of manufacturers will merely cause them to reap a future whirlwind. The need for effective, intelligent personnel work is great at the present time.

Together with this great need for effective personnel work is present the need for the elimination from all factory organizations of every non-essential activity. Insofar as personnel management recognizes the fundamental natures of the problems presented in regard to human relationships and insofar as it formulates constructive plans for meeting those problems, just so far will it justify its existence and fulfill its very necessary function.

Meyer Bloomfield said recently, "The war gave personnel management a somewhat regrettable impetus; the present depression has helped to weed out many undesirable features, although some good things have gone with them."

Sacrificing Economy for Performance

THE comparison of passenger cars on a basis of displacement per ton-foot which appears on another page of this issue should give food for thought to those responsible for the design of these and other cars, as well as to other engineers who are interested in factors which govern performance and fuel consumption. It is interesting to note that some cars use nearly double the displacement per ton-foot which others employ. The conclusion to be drawn from this comparison is that economy in fuel consumption is regarded by many users as altogether secondary to other performance considerations for it is evident that, other things being equal, the car which has a high displacement per ton-foot will run with a lower percentage of full load than the car with low displacement, and consequently use more fuel per b. hp. than otherwise. Of course, other factors, such as compression ratios and internal friction vary considerably, but it is evident that much is being sacrificed in some cases to get performance—good hill climbing ability and a high rate of acceleration—at the expense of increased fuel consumption.

The foregoing takes account only of operation on high gear. By a proper selection of transmission gears it is possible to vary consumption per ton mile, owing to the better load factor that can be secured, but this may involve more gear changing than the average operator likes. Every engineer has, of course, to make selections which involve compromises depending upon the various factors involved, but it seems unfortunate that so much is sacrificed in fuel economy when there is a real need of better utilization of national fuel resources. It is significant that among the cars showing the lowest displacement per ton-foot are some whose hill climbing and accelerating ability leaves little to be desired.

Steel Prices Main Factor, Ford Says

Prohibitive Costs Alone Can Prevent Full Speed Ahead

Frank Statement of Plans and
Prices Are Given in Exclusive
Interview

By Roger H. Burlingame

DETROIT, Feb. 25.—Production in the great Ford factory at Highland Park will be fully 75 per cent of capacity by the end of March unless it is made impossible by prohibitive steel prices.

This outstanding fact was disclosed by Henry Ford to-day in an exclusive interview with a representative of the Class Journal publications. The announcement was included in the first detailed statement he has yet made for publication of his factory plans and policies.

Seated by a window in his office with a half dozen Ford executives grouped about the room, Mr. Ford answered questions put to him without reservation, entering into discussion with the interviewer at times as to the advisability of publication, subordinating his opinion in instances to that of his executives and the newspaper man, and throughout the interview, lasting about an hour, never once sought to take the lead or divert the trend of questions.

With his chair tilted back, legs crossed, and his hands clasped behind his head, following a cordial greeting, the most talked of man in the industrial world to-day adjusted himself in a position of comfort and with patient forbearance and a smile playing about his face continually, listened and replied promptly to questions of minor detail with as much interest as though in conference on world problems.

It was suggested at the outset that the interview was for publication in magazines devoted solely to the upbuilding of the automotive industry rather than for public consumption, and Mr. Ford readily acquiesced in the request that questions vitally affecting the industry might be put to him.

Looks to Normal Output

It was during his reply to a question as to plans for factory operations looking to return to normal production that Mr. Ford sounded the big note when he declared that operations in April and May and for the future were contingent on the price of steel, adding:

"If we have to close again it will be due to the attitude of steel manufacturers."

And right here the man who talks in hundreds of millions showed his grasp of

HIGHLAND PARK PLANT WILL BE RUNNING 75 PER CENT CAPACITY BY MARCH 31

DETROIT, Feb. 25.—These facts about his gigantic business enterprises were disclosed by Henry Ford to-day in an exclusive interview with a representative of the Class Journal publications:

That 15,800 employees were working in the Highland Park plant to-day.

That 2860 cars were produced in Highland Park and branches yesterday.

That 2505 engines were built at Highland Park Wednesday.

That there were 95,000 cars in the hands of dealers and 30,000 in process of construction at the branches when the Highland Park plant closed Dec. 24.

That 57,000 cars were sold during January, liquidating the 30,000 completed in the branches and 27,000 of the dealer stocks.

That retail sales for the first half of February were 42,000.

That total production for February will be 35,000.

That sales, if the ratio continues through February, will approximate 85,000, assuring liquidation of 50,000 more of the dealer stock.

That dealer requirements for March are 70,000, necessitating a production schedule of 3100 daily, within 1100 of the record for daily production.

That working forces and production will be increased steadily until normal production is reached.

That continued operation and increasing production is contingent on steel prices and that if the company is forced to again shut down it will be due solely to prohibitive steel prices.

That there will be no reduction in the wages on specific jobs and no reduction in the minimum scale.

That the Ford Motor Co.'s reply to reports of financial stress is the announcement of steadily increasing working forces and output scheduled to reach close to normal by the end of March.

That the executives now in charge at Highland Park and River Rouge will constitute the permanent official personnel with official titles in most cases eliminated and concerted efforts being directed to development of Ford products and policies.

That 2700 men were employed at River Rouge to-day, 1700 having been added to the 1000 which have been working there without interruption throughout the period of depression.

That a production schedule of 100 tractors daily was started at the Rouge plant to-day, which will be increased as demand requires.

the details of his organization when, in emphasizing his point that steel is the big factor, he approximated the weight of the top, tires, glass and floor-boards for comparison.

The issue was brought up when Edsel Ford suggested that not only steel prices but prices of all materials would have an effect, his father stressing the point that steel was all important and prohibitive prices the real handicap to uninterrupted production.

Frequently throughout the interview Mr. Ford made reference to financiers, referring to them as "money sharks," and there was a note of exultation in his voice when, in answer to the question as to whether he cared to discuss the many reports of financial stress and alleged efforts to float a loan, he said:

Not Building Without Money

"The best answer to that question is employment and production figures just given you and the fact that we are going to build 80,000 cars in March. We must pay for materials and labor and that means a considerable sum."

The many rumors regarding conditions at Highland Park and the reports giving the number of men employed in totals ranging from 5000 to 20,000, were set at rest when Mr. Ford declared that since the reopening of the plant Jan. 31 with approximately 10,000 men, the force had been increased steadily until to-day's total of 15,800 was reached. The force will be increased in conformity with sales and demand, he said, until normal operations again are resumed.

Won't Need as Many Men

It was made plain, however, that the force never would reach the total employed during the peak last year for it has been demonstrated beyond question that the maximum of production requirements can be reached with a materially decreased force due to greater efficiency and more conscientious effort. In this connection Mr. Ford said:

"It is the universal policy and the logical course to minimize operation and production costs and evidence multiplies that by stimulating men to greater effort

(Continued on page 531)

Industry Shows Continued Gains

Chrysler Cheerful on Business Outlook

Declares Willys Plants Ready to Meet Competition—Last of Year Best

TOLEDO, Feb. 28—Walter P. Chrysler, executive vice-president of the Willys-Overland Co., and all the Willys interests, and Charles B. Wilson, vice-president in charge of the plant here, have been in conference this week looking after production plans.

The company has less than 1700 cars in process of manufacture at the present time, indicating that sales have been progressing fairly well since the automobile shows last month. The plan has been to manufacture only on demand of dealers. No definite date has been set for the beginning of a production plan, but it is understood that possibly a small schedule may be put into effect about March 15.

"It's a great deal more difficult to build up a force than to tear one down," said Chrysler. "That's the task we have on hand now and we are going to go forward and build the organization over from top to bottom. There will be all sorts of changes in the next few weeks. Many new men will be coming in and some will be going.

"We have had to eliminate extravagance in the administration of this plant, and we have made some deep cuts. There is competition ahead in the motor car industry."

Chrysler said he had avoided making any forecasts on the industrial conditions of the future because he couldn't make good guesses on affairs so contingent upon many world-wide economic factors.

"We have been through crises in manufacturing before—not quite so bad as this one we have experienced recently—but involving largely the same principles, and we are quite optimistic right now," he declared.

Would Establish Money Value

"The experts have been bringing out figures for us and we have been trying to find out what our dollar will purchase. Some say it will buy about 80 cents worth of what it could have bought before the war. But we don't know. Things are becoming more stabilized every day—we can see that.

"We have a feeling that the last three-quarters of the year will show a pick-up of about 40 per cent in business generally. But that's only a guess." Chrysler would make no comment on the financial arrangements planned for the Willys organizations.

MOSTLY SUNSHINE SEEN FOR TRADE IN MARCH

A weather forecast for the automotive industry for March indicates that while it will be partly cloudy there will be more of sunshine than there has been for several months, and that as spring approaches the "fair and warmer" flag will be displayed with increasing frequency. Here are some of the signs that the clouds are breaking:

Ford is preparing for production on a basis of 75 per cent of capacity by the last of this month.

Production in the various General Motors plants has reached 50 per cent of normal.

Most Detroit manufacturers are adding to their forces and speeding up production to meet increased orders.

Sentiment in the Detroit territory is much more hopeful than it has been for weeks.

Akron tire factories show more signs of life than they have since last spring.

Automotive plants in various parts of the country are resuming production on a small scale and gradually augmenting their forces.

Dealers in most of the industrial districts report steadily mounting sales, and even in farming sections there is increased interest in motor vehicles.

The upward trend includes both passenger cars and trucks.

Tire Business Takes Quick Upward Turn

Experiences Greatest Uplift Since Depression Began—Prepare for Ford Orders

AKRON, Feb. 28—The rubber industry in Akron has shown more life during the past ten days, than at any time since the inception of the current business depression. Two recent events of outstanding importance indicate a strong upward trend which augurs well for an early return to conditions in the industry nearly approaching normal.

First of these was announcement by the B. F. Goodrich Co., that 30,000 small size tires had been shipped to the Ford plant in Detroit. This is the largest single shipment of tires made in Akron in eight months.

Second was announcement by Goodyear Tire & Rubber Co. officials of nearly a 100 per cent increase in production, effective the last week of February. The Goodyear increase does not let down the bars for more men just at present, but for those now employed by the company it means longer hours. The increased production ticket calls for 60,000 tires a week and necessitates adding another work day.

Notice that the Ford plants would soon be running full force also has stimulated tire production, and half a dozen Akron companies holding Ford orders, are increasing production so as to be prepared for early shipment.

The Oldfield Tire Co., latest comer to Akron, and of which Barney Oldfield, erstwhile motor speedway champion is president, is laying plans for substantial increases in production this year. The Goodrich Co., while having an ample surplus on hand to accommodate immediate shipments, is contemplating an increase in production in the near future. Miller Rubber is opening up its mechanical goods and rubber sole and heel departments, and Firestone is also showing more signs of life. The Portage Rubber Co. reports as much business booked so far this year, as during all of last year, and expects to increase its volume in 1921 by more than 100 per cent.

CLEVELAND BUSINESS BETTER

CLEVELAND, Feb. 28—The upward trend of business which began with the automobile show continues, although the increase is gradual. There has been decided improvement in sentiment, however, and automotive manufacturers are much encouraged by the outlook. One plant making automobile bodies reports the addition of 350 men to its payroll.

Peugeot Not to Build Cars in United States

PARIS, Feb. 19—(Special Correspondence)—There is no intention of the French Peugeot Co. to build an automobile factory in America. Negotiations have been in hand for several months with American promoters who wish to purchase or construct a factory in the United States where Peugeot automobiles will be built under license. The French company has agreed to sell their license to this group and to supply the necessary technical staff providing American financial backing is secured. According to a statement made by one of the officials of the Peugeot company to an AUTOMOTIVE INDUSTRIES representative, American financial assistance has not yet been secured, and until this is obtained nothing will be done in the matter.

February Deliveries Approximate 1920

Actual Turnover of Business Compares with Year Previous —General Outlook Better

NEW YORK, Feb. 28—So far as cars actually sold and delivered are concerned, this month has developed a normal February sales volume. The demand for cars does not begin to compare with the pressure of a year ago, but the results in actual sales are about equal, because last year the dealers couldn't get the cars they needed on account of the traffic conditions, and this year the reduced factory schedules are barely meeting the demand.

With a few exceptions, and these principally among the higher price cars, the New York retail market has developed a gradually increasing volume of business that is regarded as entirely satisfactory.

One large distributor in the medium price cars, whose product is in the country's ten best sellers and whose contract calls for 6 per cent of the factory output, has found no difficulty in disposing of more than 10 per cent of his factory's output in the past month. This distributor's actual delivery of cars to owners follows a schedule approximately the same as in February last year. At least three other distributors of medium price cars in the New York territory are running ahead of actual deliveries during this period last year.

In the higher price cars there has been a lull of several days, following the tapering off of a fairly good market that developed just previous to the New York show early in January and reached its peak the latter part of January. But even with this condition existing to-day, there is considerable faith in the development of a stronger market as soon as the weather becomes settled. It is pointed out that February usually is a low sales month in this class.

The wholesale passenger car market is becoming somewhat steadier and is showing a healthful, sturdy increase, but a slow one. After experiencing a decidedly improved sales volume early in the month, the used car market is showing signs of sagging again.

The truck market, both wholesale and retail, is still showing the spotty tendencies that have characterized it for several weeks. While there is some general improvement, it has been slight.

SPRINGFIELD PLANTS BUSY

SPRINGFIELD, OHIO, Feb. 28—In a survey just made of industrial conditions in Springfield it was ascertained that the Springfield works of the International Harvester Co., now turning out motor trucks instead of agricultural implements, is operating a force above normal. It is now turning out 30 trucks a day.

The Westcott Motor Car Co. is employ-

ing 225 of its normal force of 250 men. The Kelly-Springfield Motor Truck Co. is pushing ahead with production. Good sized orders are expected soon, it is announced. Reports from dealers show that conditions are encouraging.

The Victor Rubber Co. is turning out 300 cord tires daily. More than 200 out of the regular force of 350 men are now at work in the plant.

Durant Studies West for Assembly Location

SEATTLE, Feb. 26—C. M. Steeves, personal representative of W. C. Durant, formerly president of the General Motors Corp., is completing an exhaustive investigation of manufacturing possibilities on the Pacific Coast and is about to leave for the east to make his report. In automobile circles it is known that Durant and his associates plan the manufacturing on a big scale of an automobile which will sell for less than \$1,000 and one of the several manufacturing plants to be built will be located on the Pacific Coast.

Steeves has made a survey of conditions in Los Angeles, San Francisco, Portland and Seattle. Civic organizations here were particularly active in seeing that Steeves did not overlook any of the advantages the city claims for an automobile manufacturing plant.

Steeves would give no intimation as to what his recommendations would be for the location of the proposed Pacific Coast plant.

Body and Glass Plants Increase Operations

TOLEDO, Feb. 28—The Milburn Wagon Co. is now employing 300 men on automobile bodies and Milburn electrics in the plant here, President Frank Suydam declared this week. He said business was increasing and that he expected to be taking on more men each week. The company is working on orders for bodies for the General Motors Corporation.

The Ford Plate Glass Co., which manufactures large quantities of glass for windshields and sedan bodies, opened a portion of its plant at Rossford near here with 600 men today.

HOMAN JOINS C. G. COMPANY

KALAMAZOO, MICH., Feb. 28—The name of the U. S. Auto Bumper Co., Chicago, has been changed to the C. G. Spring Bumper Co. Charles C. Homan, who for many years was purchasing agent at Willys-Overland and later vice-president of Hal Motor, Cleveland, which position he resigned to accept a commission in the Army in France, and who, since his return from abroad, has been connected with the Goodyear Tire & Rubber Co., has accepted the position as manager of the C. G. Spring Bumper Co. with headquarters at the office in Chicago. The company is controlled by Christian Girl.

Mining Communities Work at Full Speed

A. F. of L. Survey Shows Only Scattered Units Aside from Mines Near Normal

NEW YORK, Feb. 27—A survey of industrial and unemployment conditions being conducted by the American Federation of Labor shows conditions to be nearly normal in a few isolated districts despite the almost universal depression.

The places in which business is nearly normal are for the most part mining communities in which production activities seem to be progressing at full speed. The towns which are active because of mining work are Westville, Ill., Carlinville, Ill., Pittston, Pa., and Mahanoy City, Pa. The report from Pittston states that "Coal mines are on full time. The silk business has been dull but is taking on new life."

Four other small communities show normal activity for other reasons. In Oneida, N. Y., there have been several hundred men laid off from the factories but they were out of town men and have gone back to the farms where most of them came from. In Wisconsin Rapids, Wis., a paper mill town, few men are unemployed at the present time. Cloquet, Minn., another town in which a paper company forms the chief industry, reports that the paper company is doing a large amount of repair work on their dam and is also building another dam in the city, so that there is at least temporary employment for everyone.

These small scattered units, however, represent the only really encouraging reports thus far included in the survey. Industrial depression and unemployment is serious in nearly every other unit reported.

TO SELL REYNOLDS ASSETS

MT. CLEMENS, MICH., Feb. 28—Circuit Judge Tucker has signed an order directing Charles J. Reimold, receiver of the Reynolds Motor Truck Co., to sell at the factory in this city on March 14, all the assets of the company. These assets will be disposed of at auction in one parcel. No action has yet been taken by the stockholders who feel that their interests might be better protected if the company were thrown into bankruptcy, and if steps in this direction are not taken at once, the affairs of the corporation will be wound up as speedily as possible.

AMERICAN TIRE PLANT STARTS

YOUNGSTOWN, Feb. 28—Production of tires, tubes and hose was begun this week by the American Tire Corp., Niles, Ohio. This is the first actual operation since the company was incorporated two years ago. The output is expected to be 800 to 1000 tires per day. The company occupies the plant of the Engle Aircraft Co., which dissolved at the close of the war.

Anti-Dumping Bill Held Over in Senate

Manufacturers Support Suggested to Insure Early Action—Would Equalize Prices

WASHINGTON, Feb. 28—Senator Smoot of Utah, one of the most influential members of the Senate, advised AUTOMOTIVE INDUSTRIES to-day that the anti-dumping bill would undoubtedly protect American truck manufacturers and dealers from dumping of surplus army trucks here. The bill is pending on the Senate calendar and has passed the House. It provides for the assessment of special duties as a means to eliminate unfair competition and would operate, he said, to equalize the sales price.

This measure was introduced in the Senate Dec. 10, 1919, at a time when foreign competition became a real menace to American manufacturers. The bill was designed to provide revenue and encourage domestic industries through imposing duties. The Senate Committee on Finance directed Senator Smoot to report the bill April 8, 1920. Through parliamentary tactics, it was not considered in the second or the present session of the Sixty-sixth Congress.

The bill provides that whenever the purchase price of imported merchandise, dutiable or free, of a kind or class produced in this country, shall be less than the market value thereof, a special duty shall be assessed in the amount of the difference between the purchase price and the market value. This proviso, it would appear, would effectively squelch all efforts of English and French merchants to undersell the American dealers in trucks. Senator Smoot stated that this duty was a dumping duty and could be applied on the trucks despite the fact that the present tariff laws allow free entry as "goods returning to point of manufacture."

The act specifies that if there is no such actual market value, but the purchase price of the merchandise is less than American export prices for the same material, the tax shall be assessed on imports. The same applies to imports which are offered for sale in this country at prices less than cost of production for same equipment here.

Provides Penalty For Rebates

Another section of the House bill, as amended by the Senate Committee on Finance, provides a penalty for rebates and concessions which directly or indirectly effect a reduction or diminution of the purchase price or the selling price of the imported merchandise. It is believed that American truck manufacturers and dealers who have felt the effects of foreign competition in having American goods, originally sold to the Army, resold to foreigners and then offered on American markets at less than production cost, will support this measure and urge its immediate consideration at the

extraordinary session of the Sixty-seventh Congress.

Senator Thomas, Democrat, of Colorado, who filed a minority report against the bill at the time it was reported out of committee, told AUTOMOTIVE INDUSTRIES that he believed that the bill could be strengthened, if necessary, to cover reimportations under conditions which confront American producers. He appeared interested in the report of the British and French invading domestic markets with rebuilt machines which escaped duty owing to original manufacture here. Senator Thomas would unquestionably press this matter, but his term expires at noon Friday, when the present Congress adjourns.

Palmerton to Manage Foreign Trade Bureau

NEW YORK, March 1—P. L. Palmeron, formerly in the foreign department of the Goodyear Tire & Rubber Co., has been appointed manager of the newly created foreign trade bureau of the Rubber Association of America. He is now organizing the work and expects in the near future to be able to supply members with information on the best means of carrying on trade with foreign countries as well as the best potential markets.

The executive committee of the Rubber Association is giving careful consideration to the subject of the support to be given various good-roads organizations, and it is hoped some program can be worked out upon which the entire automotive industry can unite. Another phase of this work is connected with the efforts of the Motor Vehicle Conference Committee to have enacted uniform state legislation in relation to load schedules, tire carrying capacities, etc.

The Rubber Association also has taken up the question of standardization in the sizes of automobile tires, and its research in this direction has emphasized the need for a technical committee which is to have as its primary purpose the consideration of tire standardization. A committee of five members of the executive committee has been appointed to comprise a technical committee which will consider all standardization projects of the industry.

TO ADJUST MAXWELL CLAIMS

INDIANAPOLIS, March 1—Charles Martindale of Indianapolis has been appointed by Judge Anderson in Federal Court here as master in chancery for the Maxwell Motor Co., Inc., to receive and adjust all claims of creditors against the company within the jurisdiction of Indiana. The action is preliminary to a reorganization of the Maxwell and Chalmers companies, which have been merged.

Appointment of the master was agreed to by the Maxwell company, according to attorneys who filed the petition. A master has been appointed in a similar way in Detroit and action in the District Court at Dayton, Ohio, is also contemplated, the attorneys said.

Oppose Insurance for Confiscation

Companies Find Volstead Law Violators Not Entitled to Protection on Cars

NEW YORK, Feb. 26—"Confiscation insurance" is forbidden to all insurance companies belonging to the National Automobile Underwriters Conference, by a recent decision of that body. As practically all the large stock insurance companies covering automobiles belong to the conference, this action means practically that it will not be possible to get insurance on an automobile against its being confiscated by the Federal government for carrying liquor in violation of the Volstead law.

Insurance underwriters have in general been of the opinion that violators of the Volstead law were not entitled to insurance; and that practically all innocent victims of confiscation already insured against theft would be able to claim indemnity on the ground that the car was stolen. Perhaps the only protection which could be asked of insurance companies was against misuse of the car by a friend.

But the underwriters maintained that if this were to be covered, every enterprising bootlegger would frame his case to correspond, with the result that insurance companies would find themselves betting against a bootlegger's risk of capture.

A recent ruling of a Federal court provides that automobiles "held for trial" may be taken out on bail, that is, for deposit with the court of collateral security. If an owner feels that his car is not likely to be confiscated, that he has an open and shut case, he can, under this ruling, provide care of the car to prevent deterioration.

Oldfield Tire Company Elects New Officers

AKRON, Feb. 25—J. M. Dine, former Firestone official, has been elected vice-president and general manager of the Oldfield Tire Co. Dine has been identified with the rubber industry for fourteen years, both with Goodyear and Firestone. He served as branch manager for both companies in several large American cities.

Other new officers of the company include B. M. Robinson, secretary; H. L. Allsopp, treasurer, and M. E. Moffett, assistant treasurer. R. S. Jemison, of the Miller Rubber Co., has assumed the position of advertising manager.

The Oldfield tire, comparatively a new product on the market, designed by Barney Oldfield, former champion of the motor speedway, won recognition during the 1920 automobile racing season. Mr. Oldfield has just moved central offices of the company to Akron from Cleveland, and announces plans for a material increase in production during current year.

Road Makers to Get 1250 Army Tractors

Senate Turns Down House Action for Dumping—Bill Goes to Conference

WASHINGTON, Feb. 25—Amendment to the Fortification bill, as passed by the Senate to-day after a heated debate, provides for the transfer of 1250 tractors from the War Department to the Department of Agriculture for distribution among State highway departments. The proposal to authorize the sale of 2000 tractors, as passed by the House, was voted down by the Senate. Majority leaders under the management of Senator Wadsworth of New York, chairman of the Military Affairs Committee, championed the efforts of the War Department to retain all tractors, but the will of other Senators, sponsored undoubtedly by demands of highway commissioners for new equipment, prevailed.

During the debate it was brought out that the Chief of Ordnance of the Army estimated that the stock of tractors on hand would serve ordinary requirements for a period of five years. Senator Wadsworth, Lodge and Smoot, Senate majority leaders, directed the attention of the Senate to the fact that every tractor transferred or sold on the open market would require additional appropriations in the next few years. Senator Wadsworth predicted that for every tractor distributed to highways at this time, there would be requests for new appropriations. It was stated that the army owned 6700 tractors on Dec. 31, 1920, but this was later reduced to 6452, which are retained at present. The Army now has 3109 tractors in service, and the others are in storage at Rock Island Arsenal and at Savannah Proving Ground. According to the information given the chairman, the shelter provided is adequate and constant care is given the equipment.

Would Avoid Obsolescence

Democratic Senators suggested that inasmuch as there had been great improvement in design of tractors, it would be best to dispose of the surplus because of the obsolescence. Chairman Wadsworth stated that the balance of tractors were obligated but not assigned. He contended that the artillery continued to extend the use of the tractor in the transportation of heavy guns, as the average tractor will do as much as six horses and is maintained at lower cost. He said that artillery officers were confident that the use of the tractor would bring about a large saving. There will be another demand for tractors, Senator Wadsworth said, when the reorganization of the National Guard is completed.

The New York Senator asserted that the heavy tractors owned by the Army are not especially adapted to road uses and that no spare parts could be obtained on the open market. He pointed out

that many tractor manufacturers who built these machines under specifications prepared by the War Department were not operating. According to information given Senator Kellogg of Minnesota, the War Department has never transferred any modern tractors. The Chairman ridiculed the legislative efforts of highway commissioners whom, he said, were flooding the Senators with telegrams urging the transfer. "It is all velvet for them" Senator Wadsworth said, "they get something for nothing and do not take cognizance of the War Department's future needs." The National Guard has until 1924 to complete the organization of new units and it will require hundreds of tractors for their use. With the authorization for transfer, it would indicate that the Army will be on the market for tractors within a year instead of five as expected. The Senate bill has been sent to conference.

Goodyear to Produce New Airplane Fabric

AKRON, Feb. 26—Wade Van Orman, aeronautical expert of the Goodyear Tire & Rubber Co., has designed and perfected a leak-proof, fire-proof rubber and fabric covering for airplane gasoline tanks, which has been formally accepted by the United States Government, Goodyear officials announce. The new cover will be extensively manufactured for the government, exclusively by Goodyear.

The cover, designed especially for combat and mail planes, consists of a specially vulcanized half-inch thick rubber blanket affixed to a thick layer of several plies of tested cotton fabric. It fits directly over the airplane fuel tank.

Tests conducted by the government at the Goodyear plant in East Akron have proven that when both the covering and fuel tank are punctured by bullets, the rubber and fabric cover automatically closes and completely seals the leaks, preventing leakage of fuel and subsequent explosions in mid-air. The cover will prove particularly effective in use on combat machines, where incendiary bullets are used in aerial engagements, government officials say.

The new cover is admitted by government aeronautical officials, to constitute a material step towards attaining a greater degree of safety than heretofore gained, in airplane transportation.

MAIBOHM ADDS DIRECTORS

SANDUSKY, OHIO, Feb. 28—Three additions were made to the board of directors of the Maibohm Motors Co. at the annual meeting. They are B. C. Kramer of Toledo; George M. Zimmerman, city manager, of Sandusky, and Hal Holtom. Kramer has been elected vice-president and the other officers of the company were re-elected. Reports showed that profits for the year, before taxes and reserves amounted to approximately 12 per cent on the outstanding capital. President Maibohm said there was a gratifying revival of business and that orders were increasing.

New York Modifies Truck License Plan

Abandons Proposed Prohibitive Rates as Impracticable—Will Pay Full Maintenance

ALBANY, Feb. 26—Though the proposed plan of taxing heavy duty motor trucks from the highways of New York has been abandoned as impractical, the State legislature is proceeding with its plan to enact laws which will place the entire burden of road maintenance upon car owners. Under the tax schedule embodied in a bill introduced today fees are boosted from 50 to 100 per cent.

Included in the provisions of the measure are increases in taxes of 25 to 40 cents per horsepower. Trucks of more than three tons weight are assessed double. On a tonnage of from two to three the tax is increased from \$15 to \$23.50; three to four tons the increase is from \$20 to \$40. The ten-ton truck will pay \$110 and the tax on the 14-ton vehicle will be \$140. For every ton in excess of fourteen, the tax will be \$20.

The tax on trailers is raised from \$5 to \$7.50 where the weight is two tons or less, the increase being graduated up to the trailer weighing from ten to 14 tons, on which a tax of \$60 is levied.

The tax on omnibuses with a capacity of five persons or less is raised from \$15 to \$22.50. Where the capacity is more than 30 passengers the tax is increased \$67.50 to \$101.25.

It is estimated that the new schedules will yield \$9,000,000 a year, or \$1,000 a mile for the 9,000 miles of State highways. About \$6,000,000 was realized from car revenues in 1920. Automobile associations are planning to oppose the new rates unless changes are made in the system of administering highway maintenance.

BENDIX WINS PATENT SUIT

WASHINGTON, Feb. 26—The claims of Vincent Bendix for priority on the invention of an electric starting motor for internal combustion engines have been upheld in the United States Court of Appeals for the District of Columbia on appeals entered by Edward A. Halbleib, Frank Conrad and Joseph Bijur. In making its decision the court ruled that Bendix by reason of reducing his invention to practise before the appellants, established his right to priority.

ARABS BUY MOTOR VEHICLES

LONDON, Feb. 11—(Special Correspondence)—Reports are to hand of recent successful tractor trials lasting over 14 days in the Bagdad area of the Middle East. The Fordson was one of the number which showed up well. The Arabs appear to be progressively affected just now and are investing in motor cars, the Sheikhs even going to the cost of re-making suitable roads. The British army of occupation has this result to its credit.

Airplanes to Open Canadian Oil Field

Test As Rival to Steamers and Dog Trains to Come in Spring—Expect Rich Deposits

EDMONTON, ALTA., Feb. 25—The British Dutch Shell interests have purchased considerable holdings near the Fort Norman gusher struck by the Imperial Oil Co. of Canada, Ltd. (Standard Oil.) It is now said that the alleged 1500 bbl. per day output was a gross under-statement of production as the output of the Fort Norman gusher was about 6000 bbl. a day of the finest crude in gasoline content on the continent. However that may be, the Shell people are reported to have twelve outfits ready to move in when transportation is again possible.

The flat statement of the Federal government chief geologists that there is every reason to believe that in the basins of the Athabasca, Peace and Mackenzie rivers will be found the largest deposits of oil in the world coupled with the fact that the greatest oil interests are spending millions on development in the territory promises to result in a stampede north from here and other points, comparable to the Trail of '98, as soon as the snow barrier is broken.

The expected rush to the northern oil country this coming spring and summer has made transportation a big live question in the Canadian Northwest. After long service by dog teams, which hitherto have been sufficient for the purpose, flying machines, new steamers and railway lines are now proposed, for everybody wants to get there in a hurry.

If all the plans work out as now in prospect, there will be in the country between Edmonton and the Mackenzie River oil fields the greatest practical test of commercial aviation that has yet been attempted in Canada. Five distinct flying enterprises are proposed, all of them to be inaugurated, it is announced, this coming season. The Imperial Oil Co. already has two monoplanes on the ground, having flown them from New York under conditions severe enough to give a good hard test of winter flying, and in the early spring it will begin moving its own men and supplies into the north by the air route.

First Enterprise of Kind

This was the first enterprise of the kind, and was decided upon by the Imperial company entirely as a means of doing its own transportation work in the quickest possible time. The planes will fly between Peace River, which will be their base, and Fort Norman, and as far beyond as occasion may require.

The Canada Air Board is also understood to be planning a service into the north for the carriage of Dominion Government geologists, surveyors and scientists, who will be working in different parts of the wilderness country and well beyond the reach of other transporta-

tion service. It is claimed that there will be enough of such work to be done to keep an air service well occupied all through the season, and obviously enough it would enable a vastly greater amount of territory to be covered in the summer and autumn months than has ever been possible under the canoe-and-pack system.

F. G. Erickson, the Toronto and New York birdman, has announced his intentions of operating a flying service between Great Slave Lake and Fort Norman on a commercial basis. A Calgary company is already advertising for bookings for a flying boat line that is to begin in the spring between Fort McMurray and the Mackenzie oil fields, following in general the course of the northern waterways. But the most ambitious of all the schemes is that of Capt. E. L. Janney, of the Northern Canada Traders, Ltd., with whom is associated Major C. K. Wollan, of Los Angeles.

Dirigible to Carry 30

A dirigible capable of carrying about thirty passengers will be put on the Edmonton-Mackenzie route, according to Capt. Janney's plans, in March, and after a demonstration flight, on which a party of Canadian and American newspapermen are to be eye-witness guests, a quick service to Fort Norman and back is to be commenced. The fare will be \$1500 for the round trip.

It is the expectation of these several flight masters that there will be a rush of oil seekers and sightseers into the north as soon as spring opens and all through the summer. That, indeed, is what everyone is looking for; but the most experienced northerners are hesitating to accept the theory that there will be enough doing in the oil country to warrant a stampede.

The reports of this expected boom have already been greatly overdrawn. It has recently been stated in the east, for instance, that 3000 prospectors are now in Edmonton waiting their time to move on into the north as soon as conditions will permit. Such an army of wealth-hunting waiters has never, of course, been even approximated, and if the plans of the airmen are not based upon better facts than this, their success will be questionable.

Round Trip Cost \$1500

The commercial air routes to the north will naturally compete with the already established steamboat routes. As against the \$1500 round-trip fare by airship, the steamboats carry for \$300 from Fort McMurray to Fort Norman and return. The air route has, of course, a great advantage in point of time, as compared with one month by water. The cost by airship, as thus announced, is about the same as that of the long overland journey by dog-train. For the inexperienced man who undertakes a winter trip into the north, and who wants to go in comfort, two teams of four dogs each will be necessary, with three men, and the cost will run close to \$1500 from Edmonton to Fort Norman and back.

Chile Seeks Funds for Highway Work

Plans Expenditure of 20,000,000 Pesos Annually—Bankers Approached on Loan

NEW YORK, Feb. 28—An estimated 20,000,000 pesos will be available yearly in Chile for road construction and improvement under the new highway law of that country. Confirmation of the final approval of this law, which became effective in July of last year, is contained in letters just received by *EL AUTOMOVIL AMERICANO*, the Spanish automotive magazine of the Class Journal. The normal value of the Chilean gold peso is \$0.365, and the paper peso \$0.2065.

The revenue estimate was made by F. Pesse Smith, of Puerto Montt, Chile, road director of the Chilean province of Llanquihue, who adds in his letter that this will mean an average investment of 2000 pesos per kilometer of road. The present highways of Chile, of which only a small percentage is in acceptable condition for traffic, total about 30,000 kilometers.

These roads will be improved and maintained under the new law either by permanent or semi-permanent surfacing. The cost of a permanent surface is estimated at 20,000 pesos per kilometer. Furthermore, according to these advices, the government has under consideration a loan of 200,000,000 pesos so that it will be possible to improve a large portion of the highway system in a very short time. New York bankers have been approached on the subject of a Chilean loan and it is probable that it will be one of the Latin-American republics to receive financial consideration.

Director Smith is desirous of obtaining data on road building machinery, etc., his letter stating:

"It is of interest to us to be posted concerning the proper machinery for building highways, rock breakers, concrete making machines, compressing rollers and, generally speaking, all kinds of machinery which is efficient in the economical construction of highways."

WOULD CONTINUE DEFENSE WORK

WASHINGTON, Feb. 28—Organizations interested in the promotion of industrial research and economic movements have been attempting to convince Congress that the Council of National Defense is necessary for national welfare. The Council has several studies relating to automotive enterprise and highway development. This work will be dropped in June unless Congress appropriates a sum sufficient to maintain the present organization. The Council commenced an inventory of automotive resources and is sponsoring a standardization campaign based on their findings in this inquiry as to specifications. At present they have under consideration the encouragement of the use of chassis and other automobile parts which would be easily converted for war purposes.

Sales Tax Opposed by U. S. Chamber

Against Substitution for Excess Profits Levies—Special Tax Favored

WASHINGTON, Feb. 28—Representatives of the automotive industry who have felt that there was little probability of Congress levying additional excise taxes and that there would be a widespread demand throughout the country for some form of sales tax as a substitute for imposts which now are unpopular, will find cold comfort in the report of the committee on taxation of the Chamber of Commerce of the United States, recounting the results of a national referendum on 15 proposals for changes in the present taxation system.

There was an almost unanimous demand among the members of the chamber for a repeal of the excess profits tax but THERE WAS A MAJORITY VOTE AGAINST ANY FORM OF SALES TAX SUGGESTED BOTH AS A SUBSTITUTE FOR AND IN ADDITION TO OTHER FORMS OF TAX. The proposal that excise taxes should be levied "upon some articles of wide use but not of first necessity," partly to take the place of the excess profits tax, was carried by more than a two-thirds vote. The ballot on this question stood: For 1217; against 504.

On the question, "should a sales tax be levied instead of an excise or excess profit tax," the vote was: For 704; against 855. Those who favored a retail sale tax and those who favored a general turnover tax were about evenly divided.

The committee submitting the report opposed the sales tax but put the proposal to a vote because of the wide interest manifested in a levy of this nature. The vote against this tax is significant in view of the strong agitation throughout the country in favor of it.

N. A. C. C. Records Preference

The National Automobile Chamber of Commerce is the only organization connected with the industry which has gone on record formally in favor of a sales tax although the Motor & Accessory Manufacturers Association and the Rubber Association of America are in favor of a sales tax, though not on retail sales as proposed by the N. A. C. C. The proposal of Secretary of the Treasury Houston, that the excise tax on passenger automobiles be doubled is strongly favored by many of the Congressional leaders and members of the United States Chamber of Commerce who voted in favor of such action did so with the understanding that excise taxes levied should be supplemental to those now in effect.

There is a strong sentiment in Congress against any form of sales tax. The professed belief among senators and representatives is that if a 1 per cent tax on sales were authorized, many unscrupulous dealers would use it as a

means of bringing in additional profit by adding to their prices several times the amount of the sales tax. This, it is feared, would arouse resentment among the ultimate consumers who always pay the taxes in the last analysis and would result in the loss of votes. Advocates of the sales tax contend on the other hand that consumers would suffer less from the sales tax than they would from any other form of levy.

Government Committee to Standardize Fuels

WASHINGTON, Feb. 25—In accordance with instructions of President Wilson, an Interdepartmental Committee on Standardization of Petroleum Specifications has been organized to supersede the wartime organization, which had for its purpose the purchase of improved motor fuels and lubricants and the conservation of natural resources through more efficient utilization of petroleum products. The activities of this committee have a direct influence on the quality of petroleum products used in the automotive industry inasmuch as Government standards are accepted in the trade.

The President stated that the function of the committee is to prepare and adopt specifications for supply of petroleum and its products to any and all Federal departments and revise such specifications when the need arises giving due consideration to the amounts and qualities of crude petroleum available. Representatives of the Society of Automotive Engineers participated in recent conference when the new specifications were accepted.

Fuel Reserve Stocks Increase in December

WASHINGTON, Feb. 25—Reserve stocks of gasoline continued to increase during December despite extensive use of automobiles permissible with mild weather. Refinery statistics compiled by the Bureau of Mines show that the daily average production for December was 14,980,431 gal., or about 107,000 gal. less per day than in November, but 4,000,000 gal. more than daily average for December, 1919. Stocks advanced 108,000,000 gal. over November.

At the close of the year there were 462,381,837 gal. of gasoline in reserve at refineries. This figure is equivalent to the entire production for the month showing a marked decrease in consumption. Production of lubricating oil increased the reserve by 18,000,000 gal. over the stocks held in November. The 328 refineries operating during December had a daily capacity of 1,714,395 bbl. of crude oil.

HAYES RESUMES OPERATIONS

ST. JOHNS, MICH., Feb. 25—Hayes Wheel Co. will begin operations with a full force Tuesday, building truck wheels. The plant was closed in December and no operations have been attempted since that time.

Mellon Expected to Ease Tax Load

Industry Looks for More Con- ciliatory Attitude—Congress Misinformed on Conditions

WASHINGTON, March 1—Andrew W. Mellon, Pittsburgh banker and new Secretary of the Treasury, looms as a new and formidable factor in taxation matters relating to the automotive industry. The next Congress will take under advisement his recommendations as to means and methods of raising revenue. Congressional leaders in charge of the fiscal program say that this action does not imply that the Houston program will be discarded. On the contrary the utmost consideration will be accorded the retiring Secretary's proposals because they are founded on an intimate knowledge of the country's fiscal requirements.

Chairman Fordney of the House Ways and Means Committee advised AUTOMOTIVE INDUSTRIES that he was personally opposed to imposing a two cent a gallon tax on gasoline because it was obviously iniquitous. He stated that the intention of Secretary Houston and his tax advisers was undoubtedly based on an attractive theory in specifying that the tax should be levied at the refinery instead of distribution station. The chairman contends that the oil companies would find a way out and transfer the tax to the consumer, particularly the automobile owner.

Mr. Fordney's time has been absorbed so completely in study of tariff legislation that he has devoted little attention to the Houston program. He declared that he would inquire into the effects of an additional excise tax on automobile manufacturers and the proposed horsepower tax at an early date.

Senator Penrose and Senator Smoot, the most influential figures in the Senate Committee on Finance, have not inquired into the Houston plan in detail because of the pressure of other legislative business at the last session and the knowledge that internal revenue legislation would not be considered until the extraordinary session.

Tax Hearings to Come Soon

Senator Townsend of Michigan, who has a deep interest in the welfare of the automobile industry because of its influence on the welfare of his State, told AUTOMOTIVE INDUSTRIES that the Senate would probably take up the taxation problem within a few weeks. He pointed out that it was customary for the House to inaugurate tax legislation and the Senate use its drafts as a guide.

The fact that the new Secretary of the Treasury has an inside knowledge of the financial conditions of the automotive trade, due to his relations as a banker, is expected to influence his recommendations. It is stated that Mr. Mellon knows that the imposition of an

(Continued on page 532)

Ford in Interview Declares Optimism

January Sales Establish Record— Starts Tractor Output— Wage Scale Continues

(Continued from page 524)

and more willingness to give the best that is in them, the volume of labor required for a given task can be reduced greatly. Our office force today practically is what it was under pre-war conditions in 1914."

When it was suggested that production of 2860 cars yesterday with a force of only about 16,000 was extraordinary, Edsel Ford offered the explanation that much of the machining of material had been done prior to the shut-down in December and in consequence production with the minimum force was made possible.

Regarding reports of a car surplus of 125,000 at the time the plant shut down Mr. Ford said there were no finished cars save 95,000 in the hands of dealers and 30,000 in transit and in process of construction at the assembly branches, construction of which was completed during January. During the same month, he said, retail sales were 57,000, materially reducing the surplus which he said rapidly was being liquidated by constantly increasing sales.

Turning to W. A. Ryan, Mr. Ford asked if January sales had not established a record for that month and Ryan replied that no actual comparison had been made but that the total was probably a record.

With the ratio of sales continuing, Mr. Ford said, cars now held by dealers soon would be in the hands of consumers necessarily compelling an increase in output to meet current demand.

The Highland Park plant builds finished cars for Michigan and a part of Ohio and builds all engines and other mechanical parts which are shipped to the branches daily for assembling. The total built in the main plant and branches constitutes the daily output, with the Highland Park plant turning out about 350 cars as its quota.

2700 at River Rouge Plant

Repudiation of the many reports concerning Ford activities is emphasized not only in operations in the Highland Park plant but in the actual reopening today of tractor production at River Rouge where a force of 2,700 is employed, manning the blast furnaces, building tractors and working in various capacities. Although the Rouge plant never had been closed, Mr. Ford said, production of tractors had been stopped pending completion of preparations for resuming manufacture by the new system of pouring iron put into effect today.

Mr. Ford appeared particularly pleased to respond to the question regarding reported cuts in wages among his employees.

GRADUAL INCREASE IN CAR MANUFACTURING BRINGS RELEASE OF HELD-UP PARTS ORDERS

NEW YORK, March 1—Better business is coming in the automotive industry. In fact it already has arrived. The pulse of life is stirring in all its branches. The stimulus of increased sales at retail has worked back at last to the car manufacturers. They are moving cautiously, but they are swinging into production. There has been no big splurge about it and there is no false optimism, but there is no mistaking the tone of the market.

The evidence is unimpeachable. It comes from the parts makers who supply the manufacturers of complete vehicles. They are getting some new business, but better than that, they are receiving an increasing number of "releases" on orders which have been held up since the slump began. These "releases" do not run into huge sums, but they show that the dam has been broken and they are beginning to turn into money some of the materials on hand for months.

Individually these orders are not large, but they bring with them reports of production in plants where there has been none before and of increased output in factories which have been doing some business. Most of them are for delivery this month. Numerous parts plants which have been running at 20 per cent of normal will double their output in the near future as the result of this business.

Collections are no worse than they were, and in some cases they are better. This is true especially of houses which deal directly with automobile dealers, and shows better selling at retail. There are many reports of motor vehicle manufacturers who have been hanging on gamely and whittling down their indebtedness as rapidly as they could work down their inventories and dispose of their products. Frozen credits are being thawed out gradually.

Most of the orders are coming from passenger car manufacturers, but there is some improvement apparent even in the truck field, where business has been virtually dead.

Parts manufacturers are giving earnest consideration to the question of prices. Many of them already have cut the prices of their own products and feel strongly that the prices of motor vehicles must come down before the market can be entirely stabilized.

"There has been no reduction in the wages for specific jobs," said he, "and there has been no reduction in the minimum wage scale. Many foremen and other employees who had been working at higher wages were given opportunity to accept employment on other work at the prevailing scale for the particular job. The effort to minimize hardships by giving them part-time work even though it required their accepting wages lower than they had been paid on their regular work apparently was appreciated."

In voicing his optimism and full confidence in the future of the automobile industry Mr. Ford said:

Must Bring Back Normality

"The war and the unusual activities connected with it followed by the abnormal conditions accompanying the readjustment period brought about an unusual situation in the matter of labor and production and while everyone was for a time swept along on the tide of extraordinary industrial activity it easily was apparent that return to normal must be brought about by curtailment and readjustment all down the line. January was the breathing spell with the Ford Motor Co., following the period of intensive effort. We are all optimists out here and the figures given you are the best evidence that conditions are improving and that a brighter business outlook is becoming increasingly apparent."

On the question of successors to the men who have left the Ford organization, Mr. Ford suggested it was of little consequence who might look after the

various activities of the company so long as the combined effort served to develop and promote its policies and ideals. Waving his hand at the group of executives about him he said:

"These men are all a part of this company. They are all financially interested to the limit allowed by the company under its investment certificate system. Let us eliminate the personal equation. This is not a Henry Ford organization but rather every executive and workman is financially interested in the welfare and future of the company. Why Edsel owns 43 per cent of the stock of the Ford Motor Co."

It was demonstrated plainly throughout the interview that the matter of titles for department heads or executives was of minor consideration and in fact there seemed to be an inclination to eliminate titles in most instances with matters of policy and efforts of all departments to be directed through conferences of all executives.

To Divide Responsibility

Mr. Ford's reply to a question as to who would be delegated with authority to reply for the company to questions that develop was significant.

"All of us," said he with a smile as he indicated the entire group, the inference being that all questions must be put to the executive conference.

Throughout the interview Mr. Ford maintained an air of composure, smiled constantly and never appeared ruffled even when questions regarding the many attacks and rumors were put to him.

Buffalo Interests Aid Dunlop Company

Company's Position Here Safe-
guarded—Will Need New
Capital in Spring

LONDON, Feb. 12—(Special Correspondence)—The following statement in reference to the American interests of the Dunlop Rubber Co., Ltd., was made by F. Alexander Szarvassy, chairman of the board, at a general meeting of the stockholders today:

"Reference has been made on several occasions in the past to this undertaking, and you were informed that a company called the D. A. Trust had been organized, that £3,000,000 had been subscribed through the Dunlop America Pool, and that the home company had subscribed £1,000,000. The whole of this £4,000,000 was intended to form the Ordinary share capital of the American company, and it was understood, although I am advised that no binding agreement exists to that effect, as terms could not be agreed upon at the time—that the financing of the American company would be independently completed.

"Due, no doubt, to the abnormal financial conditions prevailing in America and in this country during the last quarter of 1920, your board was informed in October last that the proposed financing could not be carried through, and it was then that the problem arose whether it would be better to leave the American company to its fate, write off the £1,000,000 which had been invested, and risk the name of the Dunlop Company falling into disrepute, and at the same time run the further risk of some competitive company in America acquiring the partly built works, together with the name Dunlop, which would have meant competition against the home company, with its own trade mark practically all the world over. Most anxious consideration was given to this subject, and it was decided to remit the sum of £806,000 in order to avert receivership, and to give time for further negotiations.

Directors Visit America

"As I have already mentioned, two of your directors proceeded to America, and as a result of their efforts, arrangements have now been made whereby a bond issue of \$6,000,000 has been created, secured on the American company's works and undertaking, the bonds to have a year's currency, to bear interest at 8 per cent per annum. The home company has undertaken to see these bonds funded at the due date. Four million, five hundred thousand dollars of these bonds were subscribed by local interests and local bankers at Buffalo, and \$1,500,000 by the principal Ordinary shareholders in the Dunlop America Co., including the home company. With this additional finance the position in America has been safeguarded, but further working capital will be required after the completion and equipment of the mills—possibly to

SECRETARY OF NAVY LEADER IN INDUSTRY

DETROIT, March 2—Edwin Denby, who will be secretary of the navy in the Harding cabinet, has been connected actively with the automotive industry since 1909 when he joined the Hupp Motor Car Corp. as a director and treasurer. He continued in that capacity until he enlisted in the Marine Corps at America's entry into the war in 1917.

He and Garvin Denby, organized the Denby Motor Truck Co. in 1914 and Edwin became its first president. He was succeeded as president of this company by A. S. More in the summer of 1920, but remained a director and holds the position of vice-president. He was active in the direction of Denby truck affairs, resigning as president to become a candidate for nomination as governor of Michigan.

the extent of another six million dollars, or maybe somewhat more.

"The intention is to arrange this finance in America early in the spring by a bond issue of 12 to 14 million dollars, out of which the existing \$6,000,000 bonds are to be redeemed and the working capital provided. It is intended that the home company should give its guarantee, if required, as to principal and interest on this bond issue, and it is partly for this reason that the amendments in the memorandum regarding powers of guarantee are being asked for.

"The home company is taking a risk in allying itself so closely with the American enterprise; it has been, however, a question of balancing one risk against another, and it would appear that the lesser of two has been chosen. It is part of the programme to offer to the D. A. Trust shareholders shares in the Dunlop company in exchange for their D. A. Trust shares; then the home company ultimately stands possessed of the whole of the equity in the American company, and thus be justified in giving its guarantee as outlined. If the American business is a success—and I am told that there is no reason why it should not be a very great success—it will be a most important source of revenue to the home company."

WEST VIRGINIA BUYS CARS

CHARLESTON, W. VA., Feb. 28—Retail sales of automobiles were stimulated in this city by the automobile show. This section has not been so hard hit as many others by the industrial depression and the outlook is good for the coming year because Charleston's industries are diversified. As a matter of fact, the city is growing more rapidly than it ever has before. The population includes many persons of wealth and there is a good market for high priced cars.

Mellon Expected to Ease Tax Load

Longworth Bill to Sound Senti-
ment of Manufacturers —
Many New Bills Likely

(Continued from page 530)

additional tax bill of \$290,000,000, as contemplated by his predecessor, would be disastrous and tend to disturb economic conditions generally.

The Longworth bill, which will be reintroduced at the next session, is the "smoke screen" for the House Committee of Ways and Means, of which Congressman Longworth of Ohio is a ranking member. Chairman Fordney admits that the bill is intended to sound sentiment and obtain a better understanding of the effect such measures would have.

Even the most optimistic legislators admit that the Longworth plan for revising the revenue laws would not yield adequate sums. It is estimated that a levy on corporations, as proposed, at 15 per cent could not yield any sum in excess of \$1,200,000,000. The Ways and Means Committee think that higher tariff duties would probably bring about \$750,000,000 into the Treasury, though this total is apparently exaggerated considering the reduction in imports when higher rates are imposed.

Chairman Fordney and many other Congressional leaders have indorsed a movement to combine the tariff and internal revenue bills for the purpose of economy. Just what course will be taken in regard to fiscal legislation will be determined by President Harding after conferences with Senate and House leaders. With a changed personnel in the Senate and House, it is likely that many new tax proposals will arise.

One of the outstanding features of an inquiry into private opinions held by legislators as to tax proposals relating to the automotive industry is the misunderstanding that exists as to the real condition of the trade at present. There are many legislators who believe that the automobile industry has grown to such enormous proportions in a relatively short period that it is in a position to bear the brunt of taxation.

Congress Short on Figures

No better evidence of the menace which remains in the unchallenged theories is needed than statements of Senate and House leaders as to suggestions they have received as to revenue legislation. One legislator submitted a proposal to a committee chairman based on information he obtained in a newspaper, but did not verify. He told the chairman that by imposing a national tax of \$2 per car, the Government would receive \$1,600,000,000, based on a statement which he accepted that there are 800,000,000 motor vehicles in the country. His error was quickly pointed out by mention of the fact that these figures would give every inhabitant of the United States about eight machines.

Miller Dividend Is Carried Over

Charge Off of Merchandise Shrinkage Absorbs Earnings and Causes Deficit

AKRON, March 1—For the first time in its history the Miller Rubber Co. passed a regular preferred dividend today. Action of the company's directors in deferring declaration of the quarterly cumulative 2 per cent dividend on preferred stock due March 1, followed announcement that the company, despite a substantial increase in sales in 1920, had a deficit of \$735,016 on Dec. 31, 1920.

Miller sales for 1920 were \$32,891,670. This was an increase of approximately \$5,775,082, or 21 per cent over sales for the previous year.

In notifying preferred stockholders of deferment of the dividend payment, officials of the company said:

"In closing the books for the year 1920 it has been deemed advisable to give full effect to, and charge off, the entire shrinkage representing the difference between the cost to the company of raw materials on hand and the market value of the same, and also to the reduction in value of in process and finished merchandise on hand, based on lower material, labor and overhead charges, as well as settlements for the cancellation of certain rubber contracts. The shrinkage in inventory on this basis aggregated \$3,193,086 and payments made in settlement of contracts amounted to \$215,951 for an aggregate of \$3,409,037. This action resulted in a net loss for the year of \$617,878, the net profit of the company prior to the charging off of the items referred to amounting to \$2,791,158. It should also be stated that this profit was practically all earned in the first six months of 1920."

The company on Dec. 31, officials state, was obligated on unfilled purchase contracts for raw materials, the aggregate purchase price of which was \$1,500,000 above the market price prevailing on that date. The portion of this which will result in final loss to the company is said to depend on the basis of final adjustment or liquidation of these purchases.

The company has current assets of more than \$14,000,000, based on the conservative valuation of the inventory. Of these assets approximately \$2,000,000 is in cash on deposit. The total current liabilities are listed at \$8,676,000.

Goodyear Stockholders Indicate Preference

AKRON, Feb. 26—Less difficulty is being experienced in gaining the consent of the Goodyear Tire & Rubber Co. stockholders to the company's refinancing program involving \$85,000,000, than was encountered in securing ratification of the original plans which involved only \$50,000,000, officers of the company have

announced. Proxies are coming in slow, however, and may necessitate an eleventh hour postponement of the stockholders meeting now set for March 4.

Inadequate post office facilities at Akron are held responsible by Goodyear officials, for the fact that proxies are coming in slowly. It was found that many of the registered letters containing notices and proxy blanks, issued to Goodyear stockholders, were held at the Akron post office for nearly a week before being distributed for delivery.

Proxies already received, however, indicate a readiness upon the part of stockholders to give the company a vote of confidence by ratifying the refinancing plans, Goodyear officials say.

Templar Opposition Fails to Materialize

CLEVELAND, March 2—N. P. Clyburn, chairman of a minority stockholders' committee, was represented at the meeting of stockholders of Templar Motors Corp. to-day by F. S. Monnett, but, according to President M. F. Bramley, had proxies representing less than 1 per cent of the stockholders.

The board of directors was re-elected with one exception, that being the replacement of A. M. Dean, chief engineer of the company, for Attorney John Orgill. Others elected were W. M. Patterson, W. O. Cooper, D. C. Reed and M. F. Bramley. The organization meeting will take place later.

President Bramley said the company sold 40 cars in October, November and December, 20 in January, and 68 in February, and that orders have been taken for 162 for March and April delivery.

"We have 350 cars finished and 350 in process of construction," Bramley said last night. "We are employing 165 men of a normal number of about 900."

Discontinue J. L. Planes Pending Investigation

WASHINGTON, March 1—Coincident with the House resolution directing the Postmaster General to submit complete information as to the purchase and operation of Junker planes in the air mail service the Post Office Department advised AUTOMOTIVE INDUSTRIES that they had discontinued the use of the J. L. planes until additional tests could be made to determine their mechanical imperfections. It was also stated that the air mail service had employed engineering experts for improving and standardizing the Liberty motors which are now used almost exclusively by the service.

CREDITORS DIRECT PREMIER

INDIANAPOLIS, March 1—A new committee of creditors has virtually taken charge of the affairs of the Premier Motor Corp. This committee is headed by B. L. Craig of the R. M. Collins Co. of St. Louis. The other members are B. H. Miller of the American Foundry Co. of Indiana, and C. B. Reynolds of the B. F. Goodrich Co.

Keystone Tire, Buyer of A. E. F. Surplus

Practically All of Stock of 350, 000 Tires Purchased—May Impose Excise Tax

NEW YORK, March 2—Through information released by the Under Secretary for Liquidation of Stocks of the French Government, it is learned that all but 12,800 tires of the 350,000 A. E. F. surplus has been bought by the Keystone Tire & Rubber Co. of this city. Information was declined at the Keystone offices here as to the number which have been already returned to the United States or as to the sizes of the tires.

Of the total of 337,200 tires bought by the Keystone company, about 200,000 are pneumatics and 150,000 solids. They are all of standard makes, and the pneumatics, for the most part, are said to be odd sizes. Information on the number of tires involved in the sale was obtained by the Rubber Association from the American Ambassador in Paris.

It is understood that no excise tax was imposed on these tires at the time of sale to the War Department and that action will now be taken to assess this.

N.A.C.C. Offers \$5000 for Essays on Safety

NEW YORK, March 3—Prizes totaling \$5000 will be offered by the directors of the National Automobile Chamber of Commerce to school children for the best essays on the prevention of street accidents in which automobiles are involved, as part of a national safety campaign in which the chamber will co-operate with the Playground Association and the National Safety Council. Appropriation of the prize money was made at the directors meeting yesterday.

Reports on car shipments showed an increase of 50 per cent for February over January. February shipments were 33 per cent of February 1920 shipments. Reports received from dealer organizations in 20 sections of the country indicated that February was the best month since September. The outlook for March and April was pronounced better yet. Used cars were reported selling but at sacrifices in price.

WEED CHAIN PATENT UPHELD

WILMINGTON, DEL., March 1—In the suits of the American Chain Co. against the United Auto Stores, Inc., Judge Morris in the U. S. District Court here, entered the final decree Feb. 25 holding Weed patent No. 768495 of the reversible chain grip to be valid and infringed by the grips made by George J. Campbell and sold by the United Auto Stores. It was also held that the infringing grips were finished in a style or dress that so closely imitated the weed grips made by the American Chain Co. as to constitute unfair competition.

Export Shipments Continue to Gain

January Shows Drop in Cars and Trucks but Parts Consignments Increase

WASHINGTON, March 1—Foreign trade in automotive products as a whole showed a marked tendency toward expansion, according to statistics prepared by the Bureau of Foreign and Domestic Commerce on International trade during January. While demand for passenger cars and trucks fell off slightly as compared with January of last year, shipments of automobile parts, not including engines and tires, doubled. There were unmistakable evidences of a stimulated demand for foreign cars on domestic markets, as the record shows that fifty-four automobiles valued at \$94,653 were imported during January, 1921, as against thirteen cars and a valuation of \$28,694 in the corresponding period last year.

Totals for the seven months ending January, 1921, indicate that the cultivation of foreign markets is quite successful and, that based on the showing for seven months, exports of automobiles and trucks will reach unprecedented proportions by June 30. There has been a curtailment in the demand for automobile and marine engines, but this decrease has been to a large extent offset by substantial increases in exports of stationary and tractor engines. One of the noticeable developments of the foreign trade for January was the heavy demand for American motorcycles.

As to imports and reimportation of automobiles, the official figures show that foreigners are gradually finding a market for their products in this country. For the seven months of the present fiscal year ending January, there were 860 cars valued at \$905,093 imported, as against 97 cars with a valuation of \$137,636 for the corresponding period in 1920. Imports of automobile parts increased in about the same proportion. The value of these imports for the seven months ending January, 1921, was \$860,122, as compared with \$286,589. In January, 1920, automobile parts imported were valued at \$34,191, while for the same month this year they increased to \$93,841.

Creditors Committee to Confer With Apex

YPSILANTI, MICH., March 1—Creditors of the Apex Motor Corp. to the number of 35 have selected a creditors committee to handle the accounts owed by the corporation in behalf of creditors by such agreement as the committee can enter into with officials of the corporation. The committee is headed by John French, president and general manager of the Michigan Stamping Co., Detroit; W. E. Hobell, treasurer of the Franklin Press, Detroit; Andrew Hochstrasser, of

the Warman Brass & Aluminum Co., Cincinnati; E. F. Goodwin, cashier First National Bank, Ypsilanti, and M. M. Reed, president Ypsilanti Savings Bank. The five committee men represent the largest amounts owed by the corporation.

The committee was empowered by creditors assembled to act for them in extending further time for the payment of debts, and to act with corporation officials in working out an agreement.

Bethlehem Stockholders Find Position Serious

ALLENTEW, PA., March 2—Affairs of the Bethlehem Motors Corp. are declared discouraging by the stockholders' committee after an investigation of the affairs of the company. The statement of the committee follows:

"The committee has examined a 'report on examination of account' of Aug. 25, 1920, and this report and information which has been obtained from other sources is most discouraging. Assets taken over by the receiver for the company consist of total assets of \$4,396,707, of which \$2,685,567 are considered current assets. Total liabilities, all of which are current, are \$3,222,544.

"Seriousness of the situation from viewpoint of stockholders is indicated by an analysis of the statement. The corporation's liabilities amounted to \$3,322,548, against which is had only \$620,963 of readily liquid assets. Value of inventory (which under recent and present condition of automobile industry must be regarded as far from readily liquid) was \$2,064,003. Accepting the inventory at that figure and assuming it to be readily liquid, current liabilities exceed current assets by \$536,977.

"The committee frankly states that in face of the figures the situation is discouraging, but it is not without hope that if conditions in the industry change for the better and proper management and adequate working capital can be obtained, a reorganization or adjustment can be had which will materially improve the present situation of the stockholders."

Kissel Drops Equipment and Lowers Price \$700

HARTFORD, WIS., Mar. 1—by using wood wheels instead of wire wheels, eliminating the bumper, snubbers, clock and some minor articles, the Kissel Motor Car Co., has been able to place the De Luxe touring car minus the De Luxe fittings on the market for \$2775 which is \$700 under the price of the more elaborately fitted model. All other details remain as before.

BRISCOE TO TAKE INVENTORY

JACKSON, MICH., March 1—Briscoe Motors Corp. will be closed for approximately 10 days for the purpose of taking the annual inventory, Feb. 28 being the closing of the fiscal year. In making the announcement officials took occasion to emphasize that the shut down merely was for inventory purposes and in no sense due to lack of business.

Parts Service Cuts Profits of Dealers

Truck Makers Fear Limiting of Business to Sales—To Confer Further

CHICAGO, Feb. 25—Representatives of the Motor Truck Manufacturers Association and parts and unit makers met at an all-day session at the Hotel La Salle yesterday to discuss the question of service and distributing stations which the manufacturers of parts and units have been establishing throughout the country and which, it is felt, will affect more and more as time goes by the business of the truck dealer.

The discussion brought no tangible results though it indicated that there is very little disposition on the part of the parts and unit makers to relinquish the ground they have already gained or to stop from continuing to establish stations with the ultimate view of twelve hour service. It is expected that they will adopt a program of future procedure in the matter of opening up new territory and will submit it to the truck manufacturers for suggestions.

The invitation for the conference was extended by the truck association and was accepted by a large number of the parts and unit makers who either have already established stations or are contemplating doing so. New phases of the situation are continually cropping out, making a satisfactory solution of the problem equally difficult for both branches of the industry. The difficulties will be settled at conferences.

Individual service and distributing stations for parts and units were started by the makers several years ago, but not until recently has the expansion been so great as to cause the truck manufacturers to take action. Now there is a determined move on the part of the manufacturers to do something that will meet the situation.

Would Combine Stations

There are indications that in cities where one part is being handled by a parts maker distributor, this same distributor will take on the product of some other parts maker, thus doing away with a multiplicity of parts station in any one community. The expansion of such stations necessarily will affect the regular truck station handling service, for where a part can be purchased from a parts station direct service will be done either at that station or at a repair shop nearby in cases where the parts distributor does not handle service.

Such a condition will mean that the truck dealer or distributor service station will find its profits from the service end of the business considerably curtailed unless some arrangement can be effected whereby as complete a stock of parts can be carried as that carried by the parts distributor and that the dealer or distributor of trucks will find his sole business to be in selling trucks.

INDUSTRIAL NOTES

Atlas Wheel Co., Cleveland, is to erect a new factory that will have a maximum capacity of 3000 wheels per day. The present plant of the company has been outgrown. Announcement about the new factory was made at the annual meeting of stockholders. Directors re-elected were: H. P. Arnt, David D. Walker, H. A. Duetemeyer, E. S. Reed, E. E. Ledeger, M. McC. Everhard and E. A. Fischer. Arnt was chosen president, Everhard vice-president and Walker treasurer.

Nash Motors Co. is starting work this week on the construction of another machine shop unit of its new four-cylinder car division works in Milwaukee. The main shops were completed late last fall and the plant is now in operation on a regular schedule. The present work is a continuation of the original plans of the Milwaukee plant project, which will cover about two years of construction work.

Packard Electric Co., manufacturers of Packard transformers and Packard starting, ignition and lighting cable, has moved its New York offices to the Printing Crafts Bldg., Eighth Avenue at Thirty-fourth Street. J. Ed. Erickson, manager for the New York district, is in charge.

Robertshaw Mfg. Co. has moved the sales office of the industrial department from New York to the factory at Youngwood, Pa. W. D. Crouch, sales manager of the industrial department, has been made general sales manager over both the industrial and domestic departments.

General Motors Corp. will change the name of the new Durant Building, Detroit, to the General Motors Building. W. C. Durant has resigned as president and director of the Durant Building Corp. and A. P. Sloan, Jr., has been chosen to succeed him.

Apple Electrical Mfg. Co. has been organized in Dayton, Ohio, with a capital of \$500,000 cumulative preferred stock and 5000 shares of common stock of no par value, to manufacture a line of dynamo-electrical machinery.

Consolidated Instrument Co. has been formed with offices in New York, to render service in connection with all types of speed indicating and recording instruments and devices.

Kant Kut Tube Products Co. has been organized in Indianapolis to take over the ignition wire tube department of the E. C. Atkins Co.

Cutler-Hammer Mfg. Co. held a general sales meeting in Milwaukee Feb. 14 to 19, which was attended by all district office managers.

Stewart Mfg. Corp., Chicago, has opened a permanent Cleveland office under the management of E. P. Grismer.

Grant Motor Car Corp. announces that it has discontinued the building of trucks indefinitely.

Calumet Truck Body Corp. will name its new product the Calumet All-Purpose Truck Body.

LIBERTY STARTER RESUMES

DETROIT, Feb. 25—Liberty Starter Co. which makes the majority of starters for Ford cars and which has been closed more than two months, has reopened with a few hundred men and the force will be increased steadily until a maximum of

750 is employed, this total representing about 50 per cent of the normal force. A five day week schedule will prevail at the plant for the present.

"We will ask the men to give us their best efforts and there will be no cut in wage," said President Hartwig. "The five-day week plan will be maintained until increased business justifies a full week."

Stewart-Warner Raises

\$2,000,000 New Capital

CHICAGO, Feb. 28—The Stewart-Warner Speedometer Corp. has sold to the Central Trust Co. of Illinois \$2,000,000 of 8 per cent five year convertible bonds to finance the purchase of the business of the Van Sicklen Speedometer Co., to pay bank loans which amounted to \$200,000 on Dec. 3, and to reimburse the treasury of the Stewart-Warner Corp. for improvements made in the last few years from surplus and earnings. The bonds will be convertible into Stewart-Warner stock at \$40 a share.

The products of the Van Sicklen Speedometer Co., which is of the air type, will add variety to the Stewart-Warner line which is of the magnetic type. This is the second competitor taken over. The Warner Instrument Co. was acquired in 1912, the consolidation forming the basis for the present corporation.

New Air-Cooled Car
for Fall Production

PHILADELPHIA, Feb. 25—The newly organized Fox Motor Car Co., whose president is Ansley H. Fox, head of the A. H. Fox Gun Co., will open its plant at Tabor, next week. The factory has 100,000 feet of floor space and improved machinery and equipment. It is expected that the new car will be placed on the market in the fall. It is planned to produce no less than 2000 cars the first year. The Fox car will be new in design, embodying an air-cooled system. The price of the touring car will be \$3500.

Ansley H. Fox maintains an office at Broad and Huntingdon streets. Louis E. Fifer is secretary. The directors are the foregoing and S. M. Germane, Colonel Sheldon Potter, formerly director of Public Works of Philadelphia; Budd G. Nice, Frank H. Schrenk, M. A. Sherritt and Walter J. Rice.

INDEPENDENT TO MAKE TRUCK

YOUNGSTOWN, OHIO, Feb. 28—The Independent Motor Truck Co. announces that it will get into production soon on a 3½-ton vehicle which has passed all tests satisfactorily. The company has been in process of development for three years and now has a capitalization of \$1,000,000. A recent combination has given it control of two truck body factories and it is expected other units will be added in the near future. It is understood that a speed wagon to sell around \$1500 will be put out in the spring.

METAL MARKETS

IRON and steel prices continue in the twilight zone. Sagacious automotive purchasing agents, however, are not permitting the numerous smoke screens that make for still lower visibility to warp their judgment of market conditions. Newspaper reports "play up" daily price cuts by this or that producer when, in fact, such cuts do not represent new reductions but merely signify that the individual interest named has fallen in line with the price levels previously established by other "independents." Because of its cumulative character this sort of publicity tends to create the impression that the market has declined to much lower levels than it really has, and to enhance the danger of an unnatural rebound in prices. Prices for steel are still more than double what they were in 1914, although 27½ per cent below those prevalent a year ago. There is a disposition among sheet rolling mills in the Youngstown district to make concessions for second quarter deliveries, the general anticipation being that there will be a sharp reduction in the wage schedules of sheet mill workers for the March-April period. After all, however, the market's true test these days is the reception accorded to individual bids and, in what little new business is being placed for automotive consumption, this procedure is being religiously followed. A Middle West buyer offered the other day to take on 1000 tons of malleable iron at \$25 a ton. According to latest reports, he has not yet succeeded in securing an acceptance at that level, the producers asking \$27, valley. It is quite likely, however, that a compromise offer on the prospective buyer's part of, say \$26, would have proved acceptable. The situation with reference to pig iron must be considered apart from the outlook for steel. The former simply can not absorb the enhanced freight rates without showing a sharp bulge over pre-war levels. In the case of finished steel, this increment in costs is spread over a much higher ton price and the unavoidable bulge, expressed in per cent, therefore is more slight.

Pig Iron—What few round tonnage sales are consummated are negotiated at prices that remain undisclosed. The nominal market price, \$27, valley, for malleable and No. 2 foundry, applies solely to carload transactions. Steel makers are reported to have sold some "off-grade" basic at \$24, valley. The "off-grade" qualification is obviously for the purpose of not hurting the market.

Steel—Slightly improved movement of steel bars to automotive parts manufacturers is reported. Cold-finished bars could be had on fresh orders at as low as 3.25c., although the hot-rolled bar market is still at 2.10c., Pittsburgh, and producers of the cold-rolled figure on a differential of \$25 per ton. Cold-rolled strip steel is quoted at around 6c. Reinstatement of parts orders by the Ford Motor Co. is expected to quicken shipping orders on old contracts. Sheet prices are working toward lower levels and 3.85c. for black has been spoken of for representative second quarter deliveries.

Copper—Although tonnages involved are light, a little copper is moving to the automotive brass foundries in the Middle West and Connecticut valley. While producers maintain 13c. as their price, so as not to injure the sale of the \$40,000,000 bond issue recently put on the market, sales in the "outside" market have been as low as 12½c.

Tin—Considerable Chinese tin is coming in, and this grade is more actively offered.

FINANCIAL NOTES

C. M. Hall Lamp Co. shows total assets of \$1,539,988.27 in its annual report as of Dec. 31, compared with \$1,561,007.83 the previous year. Current assets were \$1,007,925.64 and current liabilities \$29,994.75, against current assets of \$1,037,213.52 and current liabilities of \$254,375.26 in 1919. Net working capital was \$977,930.89, compared with \$782,838.26 the previous year. Fixed assets less depreciation reserve are appraised at \$523,867.66. Surplus is \$164,612.75 as against \$211,251.76. No change was made in reserves for contingencies amounting to \$345,380.81.

General Motors Corp. has sent a letter to common stockholders informing them that they will be given an opportunity to purchase sufficient fractional stock warrants to complete one full share of stock or to dispose of their present holdings of fractional stock warrants totaling less than one share in each case. The price paid will be the bid price for General Motors common stock as quoted at the close of business on the New York Stock Exchange the day previous to the one on which the order is received.

U. S. Radiator Corp., in its statement as of Jan. 31, reports the most successful year in the company's history, with gross earnings of \$1,321,568.98, compared with \$1,113,828 the previous year and \$1,227,458 in 1918, the company's best previous year. Operating profits were \$1,220,214.68 and total income less interest charges was \$1,130,674.65. Net earnings were \$927,059.51, after charges of \$203,615.14 for depreciation on plant and equipment. This total was approximately \$150,000 greater than in 1918.

White Motors Co. shows an operating profit after deducting all administrative expenses, but before providing for depreciation in inventories, amounting to \$3,486,704. Reduction of inventories from cost to market values amounted to \$1,193,927, leaving an operative profit of \$2,292,776. The net profit available for dividends on the capital stock was \$2,410.014. This is equivalent to \$4.82 a share. Gross sales for the year were \$51,998,122 as compared with \$41,667,696 in 1919.

General Aluminum & Brass Mfg. Co. reports for 1920 a surplus of \$828,390.17 and net worth of \$3,017,340.17. Manufacturing inventories were \$1,118,583.66, current liabilities \$526,723.80 and net current assets \$1,166,375.88. Plant account depreciation is given as \$1,850,864.29, while \$72,256.26 is due from employees on stock. Cash on hand is \$22,690.45 with accounts receivable \$227,682.22.

American Bosch Magneto Corp. reports net profits for 1920 of \$945,700, which is equal to \$9.45 a share on the 100,000 shares of capital stock outstanding. In 1919 net profits were \$921,963, equal to \$9.21 a share, but in that year it was not forced to write off anything for inventory adjustment. Inventories at the close of 1920 were carried at \$4,344,727, compared with \$2,928,582 at the end of 1919.

Michigan Stamping Co. reports surplus of \$316,974.71 with total assets of \$4,352,881.49 as of Dec. 31. Total sales are given as \$4,804,142.56 and accounts receivable \$664,195.84. Plant account is \$1,963,752.94 and merchandise inventory \$1,346,619.85. Reserves for depreciation are \$290,916.77, and for Federal taxes for 1920 \$70,000.

American-La France Fire Engine Co., Inc., and subsidiary companies, report net profits after Federal and Canadian taxes of \$597,074, which after allowance for preferred and common stock dividends leaves a surplus of \$252,308. With the previous surplus the company now has a total of \$1,405,010.

Hood Rubber Co. reports sales for 1920 as \$32,867,000, which compares with \$25,444,016 in 1919. Tire sales were \$8,700,000, against \$6,500,000 in 1919. The balance sheet shows an increased surplus of over \$1,000,000 after the stock dividend of \$2,000,000 is deducted from surplus of Dec. 31, 1919.

Kalamazoo Chain Co. has been taken over by the Hodges Chain Co. of Galesburg, Mich., which has just been organized for \$60,000, with \$50,000 subscribed and \$10,000 left in treasury stock.

Kroyer Motors Co. is offering the \$500,000 unsold portion of an original offering of \$1,500,000 7 per cent cumulative preferred stock at par (\$100) plus a 100 per cent common stock bonus.

Clum Mfg. Co., Milwaukee, has increased its authorized capitalization from \$100,000 to \$250,000, to accommodate the growth of its business. Valentine Fina is president and general manager.

Autocar Co. has declared a dividend of 1 1/2 per cent payable March 10. In the previous two quarters the company declared quarterly dividends of 2 1/2 per cent.

Kelly-Springfield Tire Co. has declared a quarterly dividend of \$1.50 a share on the 6 per cent preferred stock of the company, payable April 1.

Viking Motors Co., Detroit, with a capital of \$100,000, has been incorporated to build aircraft motors and accessories.

Portage Rubber Co. stockholders have formed a committee to take care of the \$1,500,000 refinancing program.

Pierce-Arrow Motor Car Co. has declared a quarterly dividend of \$2 a share on preferred stock, payable April 1.

Watson Products Seeks Funds to Continue Plant

SYRACUSE, N. Y., Feb. 28—Attorneys for Milton Delano, receiver for the Watson Products Corp., have obtained an order to show cause why he should not be authorized to issue \$250,000 worth of receivers certificates in order to continue the business of the company under a schedule prepared by Albert A. Kessler, president of the company, who has been conducting the factory for the receiver. The schedule filed with the court by Kessler shows quick assets of \$913,057 including \$74,554 in cash and the remainder in inventories. The statement shows that a reduction of one-third from stock prices has been made from the current value of the inventory.

The receivership is a friendly one to permit reorganization of the Watson Products Co. as the Watson Truck Corp. The old company owns 2001 shares of the common stock of the truck corporation. The only assets of the new company consist of the preferred stock of the Dunkirk Axle Corp. which is a reorganization of the Empire Axle Co.

Kessler states that an option already has been given for the sale of this entire block of preferred stock in the axle company and that "if the assets of the Watson Products Corp. should be merged with the assets of the Watson Truck Corp. and a sale should be made under the option, it would create a large amount of working capital for any company succeeding to its business."

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK. Mar. 3—The money market last week was quiet with a small supply and with light transactions. Call money ruled at 7 per cent with a range of 6 per cent to 7 per cent, the same as the previous week. Time money was unchanged at 6 1/2 per cent to 7 per cent for 60 and 90 day paper and 6 1/2 to 6 3/4 per cent for the longer maturities.

The week-end statement of the New York Federal Reserve Bank showed a less favorable reserve position. Gold reserves declined \$12,512,000, and total cash reserves \$13,873,000. Total bills on hand increased \$24,452,000 and total earning assets \$24,752,000. Federal Reserve Notes in circulation in this district increased \$4,392,000, while Federal Reserve Bank Notes decreased \$680,000.

For the first time in the current year the reserve ratio of the Federal Reserve Bank as a whole declined. The ratio of gold reserves to Federal Reserve notes in circulation after setting aside 35 per cent against net deposits declined from 58.5 per cent to 58.1 per cent. Gold reserves increased \$7,663,000. Federal Reserve notes in circulation increased for the first time this year by \$14,262,000. Federal Reserve Bank notes declined \$4,106,000. Total bills on hand increased \$35,475,000 and total earning assets \$35,227,000. Net deposits increased \$26,479,000 and bills discounted secured by Government war obligations increased \$13,793,000.

The London money market appears to be in about the same strained condition that the New York market was in December. Short term discounts touched 7 1/4 per cent, the highest since the November panic of 1890. The official discount rate of the Bank of England, which is ordinarily "on top" of the market, is only 7 per cent. Partly responsible for this money tightness, undoubtedly, is the pressure of income and excess profits taxes which are due by March 31, the end of the fiscal year.

AJAX PASSES DIVIDEND

NEW YORK. Feb. 28—Directors of the Ajax Rubber Co. have decided to pass the quarterly dividend of 1 per cent on the common stock. The dividend was reduced three months ago from \$1.50 a share to \$1. The action of the directors was influenced by the poor showing made last year. They felt that all the company's resources should be reserved to finance business to meet the demand for tires which it is expected will increase with the approach of spring. They were informed that reports from dealers indicate an earlier resumption of normal operations than had been expected.

Stockholders of the company re-elected the retiring directors with the exception of Harold W. Stimpson, who declined to serve another term. Benjamin Briscoe was elected to the board in his place.

Men of the Industry

G. S. Crane, who has been manager of the Cleveland office of the Cutler-Hammer Mfg. Co., will become manager of controller sales at the main office in Milwaukee. L. B. Timmerman will be in charge of the Cleveland office, and will act in the capacity of assistant to A. G. Pierce, manager of the central district. The Cincinnati office will become a part of the central district with R. I. Mauer as branch manager. E. N. Lightfoot will assume the title of manager of the heating department with headquarters at the New York works.

J. G. Utz, who was associated with Christian Girl in the Perfection Spring Co. and Standard Parts Co. for about ten years, and who, since he resigned from Standard Parts, February last, has devoted a part of his time to the consulting work of the C. G. Spring Co. and the balance of his time to expert spring consulting for automobile manufacturers, has arranged to give up his consulting office and devote all of his time to the C. G. Spring Co. as vice-president.

George C. McMullen, who has represented both the Timken Roller Bearing Co. and the Timken-Detroit Axle Co. in the Pacific Coast territory for the last three years, will in the future devote his entire time to sales engineering in the sole interests of the Timken Roller Bearing Co. He will maintain his offices in Room 450, Monadnock Bldg., San Francisco. McMullen's former assistant, C. H. Brooks, will take care of the business of the Timken-Detroit Axle Co.

J. F. Richman, one of the old guard of the automobile business, has resigned as superintendent and production manager of the Allen Motor Co. of Columbus. Richman has not disclosed his plans for the future, but it is understood that a private enterprise in Columbus will occupy part of his time. Richman has been identified with the automobile industry since the early days of the Olds Motor Works at Lansing, Mich.

E. C. Shaw, director and for many years vice-president of the B. F. Goodrich Co., has been named one of three members of the new state board of administration of Ohio by Governor Harry L. Davis. Shaw has accepted the appointment, but will continue his official identification with Goodrich as a director, in connection with his new duties.

W. W. Clark, export manager of the Hart-Parr Co., has just returned from a four months' business trip through Europe. He found Europe suffering from the same economical troubles as America, but with conditions much worse on account of the unstable exchange which has made trade almost prohibitive.

Frederick P. Nehrbas, connected with the Premier Motor Corp., has resigned, effective March 1. After a short rest, it is his intention to locate along the Great Lakes or in the New England States, where he was intimately known prior to locating in Indianapolis.

C. B. Rose, for the last few months supervisor of the Moline Engine Co. plant, has been appointed general manager and will be formally elected vice-president of the company. Rose will continue his connection with the Moline Plow Co. as consulting engineer.

E. Gruenewald, who has been associated with the R. & V. plants since 1906, is entering the field as consulting engineer, and will

continue affiliations with the R. & V. organizations as consulting engineer for both the Moline Engine and the R. & V. Motor.

John S. Ogilvie has resigned as assistant treasurer of the Mutual Tire & Rubber Co. and as treasurer of some of its associated corporations and is now secretary-treasurer of Horn, Severson & Ogilvie, Inc., general insurance brokers, New York.

Homer M. Eichelberger, for the past three years associated with the advertising department of the Franklin Automobile Co., Syracuse, in charge of production, has resigned, to become advertising manager of the Syracuse Washing Machine Corp.

Albert E. Rosenberg has resigned as vice-president and purchasing agent of the E. G. Mfg. Co. to become a representative for Claussen Tube Works, Hardy Mfg. Co., U. S. Metal Goods Co., Waldenburg Bros. and American Auto Lamp Co.

C. E. Franks has been appointed export manager of S. F. Bowser & Co., Inc., in all export markets outside of Europe. Ralph G. Schulze, former export manager, has been made European managing director.

Harry P. Meredith, former manager of manufacturing of the Curtiss Aeroplane & Motor Co., Buffalo, has been made general works engineer of the Maxwell-Chalmers Motor Co., Detroit.

Frank K. Dolbeer, one of the old timers of the Willys-Overland organization, has resigned as treasurer. The duties of the office will be taken over for the present by J. H. Gherkins.

J. M. Crawford, chief engineer at the Allen Motor Co., has been promoted to manufacturing manager, but will retain charge over all engineering departments.

Mitchell Mackie, sales manager of the Waukesha Motor Co., Waukesha, Mich., has resigned, effective March 1. His plans for the future are not announced.

Robert Rubin has been added to the engineering staff of the Radcliffe Turbine Drive Co., New York, makers of the new turbine drive for motor cars.

Guy C. Core, former advertising manager of the Jackson Motors Corp., Jackson, Mich., has joined the Horsting Co. advertising bureau, Chicago.

W. H. Ellis and **C. B. Clarke** have been added to the sales force of the Hilo Varnish Corp., Brooklyn.

J. Wesley Bean, formerly secretary-treasurer of the Acme Universal Joint Co., Kalamazoo, has been appointed auditor of the city of Kalamazoo.

C. F. Nelson, of Minneapolis, has accepted the general superintendency of the plant of the Reed Foundry & Machine Co.

C. A. Woodruff, former purchasing agent for the Chalmers Motor Co., the Saxon Motor Car Co. and the Liberty Motor Car Co., has joined Briscoe Motors as director of purchases.

SCHARTOW FORMS NEW COMPANY

MILWAUKEE, Feb. 28—**F. E. Schartow**, founder and president of the Schartow Mfg. Co., which moved from Racine, to South Milwaukee about a year ago, has disposed of his interests and has organized the Schartow Iron Products Co., which will locate a plant in Racine.

It will manufacture a diversified line of automotive equipment, hardware, etc. Work is under way on a foundry and machine shop to be ready about March 21.

The Schartow Mfg. Co. of South Milwaukee, following the retirement of Schartow, has changed its corporate style to the Midland Co. The product, including chains, hardware, harness and saddlery hardware, etc., will continue to be trade-marked "Sharto." The present officers are: President, R. A. Nourse; vice-president, T. E. Ward; secretary and treasurer, C. P. Nourse.

W. M. Anthony Retires as Maxwell Treasurer

DETROIT, March 1—**W. M. Anthony**, treasurer of the Maxwell-Chalmers organization, has resigned to take effect today. No successor has been appointed, but it is understood Walter P. Chrysler, chairman of the management committee, has selected a man for the post. Anthony, who is 70 years old, has been with Maxwell-Chalmers a long time and his retirement, according to officials, is due to advanced age. It became known today that a general reorganization of the Maxwell-Chalmers personnel is being carried out with the idea that the company's position would be bettered by the induction of new officials into several positions.

The reorganization plan started with the resignation of Roy M. Hood, long-time purchasing agent, who was succeeded by A. C. Downey. The resignation of Ordon Muir, advertising manager, who was succeeded by W. J. Matimore, and the acquisition of A. E. Barker as sales manager were in accordance with the determination of officials to rejuvenate the organization. An official of the company said many department heads had formed friendships and alliances which precluded giving their best efforts to the organization.

President Ledyard Mitchell said today that the company, at the time of the shutdown last July, had 16,000 Maxwell cars on hand and 5500 Chalmers, of which 10,000 Maxwell and 4000 Chalmers have been sold. President Mitchell said the company is turning out 50 Maxwells and 20 Chalmers daily.

Stearns Earnings Show 10 Per Cent Increase

CLEVELAND, Feb. 28—Profits of the F. B. Stearns Co. for 1920 exceeded those of 1919 by about 10 per cent, stockholders were informed at the annual meeting. Business for January was as good as in the same month of 1920 and the company now is operating at about 95 per cent of normal. The parts business has been entirely satisfactory and the company now makes every part that goes into the Stearns car.

Richard Garlick, treasurer of the Youngstown Sheet & Tube Co., was elected a director to succeed Paul Wick of Youngstown who resigned. The other directors were re-elected.

Calendar

SHOWS

- Mar. 5-12—Atlanta, Annual Automobile Show, Atlanta Automobile Dealers' Ass'n, Auditorium, Virgil Shepard, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 5-12—Pittsburgh, Annual Automobile Show, Automotive Ass'n, Inc., Motor Square Garden, J. J. Bell, Mgr.
- Mar. 5-12—Atlantic City, Annual Automobile Show, Automobile Trade Association of Atlantic City, Million Dollar Pier, A. H. Generatzky, Mgr.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers' Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automobile Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 7-12—Nashville, Annual Automobile Show, Nashville Automobile Trade Ass'n, Page Bldg.

- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- Mar. 14-19—Washington, Annual Automobile Show, Washington Automobile Dealers' Ass'n, Rudolph Jose, Chmn.
- Mar. 19-26—Detroit, Annual Automobile Show, Detroit Automobile Dealers' Ass'n, Morgan-Wright Building.
- April 3-9—Denver, Annual Automobile Show, Auditorium.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.
- April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.

- May 28, 1921—Czecho-Slovak International Automobile Exposition of Cars, Trucks, Tractors, Motorcycles and Equipment, Prague.

- May 28-June 8—International Automobile Exhibition, Basle, Switzerland.

- June, 1921—Reykjavik, Iceland, Agricultural Exhibition—Agricultural Machinery—Icelander Agricultural Society, Reykjavik, Iceland.

- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Perpignane, Paris.

- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

CONVENTIONS

- May 4-7—Cleveland, National Foreign Trade Council.
- May 17-19—Buffalo, Convention of Factory Service Managers, Auspices of Service Committee, N. A. C. C.

- Oct. 12-14, 1921—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

RACES

- July 24—Grand Prix, Le Mans.

S. A. E. MEETINGS

- Boston section—March 18.

- Buffalo section—April 19—Paper on "Carburetor Performance," by F. C. Mock.

- Dayton section—May 3.

- Detroit section—March 25—Discussion of "The Relation Between the Industry and the Department of Engineering Research of the University of Michigan," by Prof. E. A. White.

- Metropolitan section—March 10—Paper on "Brakes," by H. G. Farwell.

- Metropolitan section—April 14—Paper on "Low Grade Fuel Carburetion," by A. H. Beach.

- Midwest section—March 11—Discussion of storage batteries.

- Minneapolis section—April 6—Discussion of repair equipment.

- Washington section—March 18—Highway and Highway Transport Trading.

- Washington section—April 1—Aeronautical Engineering Session.

Boston S.A.E. Section
Visits Rolls-Royce Plant

SPRINGFIELD, MASS., Feb. 25—Over 125 members of the Boston section of the Society of Automotive Engineers and guests met here today for the regular monthly section meeting, which took the form of a visit during the afternoon to the Rolls-Royce factory where several hours were spent, and an evening meeting starting with a dinner and followed by an address on a Comparison of European and American Automotive Practice by Maurice Olley of the Rolls-Royce company. Both the visit and the evening meeting were most successful, many members and guests attending from Boston, Hartford, Syracuse, and other New England cities. President David Beecroft attended.

During the factory visit the party was divided into groups of ten who under a leader were taken through all factory departments and stops made at nearly every stage of manufacture. Every effort was made to let all get any information desired. Factory departments were literally unlocked for the occasion.

At the evening meeting Mr. Olley gave one of the best comparisons of the motor industry in England, France and America that has been heard. The present British design has been largely determined by such factors as cost, competition by motorcycles, roads, climate, limited size of the industry, the spirit of adventure in the Englishman and lack of definite money standards.

The French car has been largely determined by the demand for high speed on the long straight roads, adequate brakes, carburetion intended specially for speed, stiff springs, and without any special

claims to quietness. It is uncomfortable to ride in and uncomfortable to operate.

The American car is the most convenient vehicle in the world to operate and to drive and is best able to get any place whether there is a road or not. It is not a speed monster as are the European cars; it is not pleasant to steer; its brakes are deplorable; and its bodies are not comfortable or well made.

Service Men to Hold
Convention in Buffalo

NEW YORK, Feb. 25—Plans are rapidly being completed for the semi-annual convention of factory service managers under the auspices of the Service Committee of the National Automobile Chamber of Commerce. It has been definitely decided to hold this next convention in Buffalo and the dates will be May 17, 18 and 19. Among the subjects under consideration for discussion are:

Advantages and disadvantages of the unit replacement system for continuous service.

Service equipment.

Service department organization.

Growth and responsibilities of the service department.

Field organization.

Relation between the engineer and the service department.

Better co-operation between equipment service stations and dealer service stations for the benefit of the owner.

MOLINE ENGINE RESUMES WORK

EAST MOLINE, ILL., March 1—The Moline Engine Co., after two months of idleness, reopened to-day with a force of 60 men. It will be gradually increased, company officials announce. The company produces the poppet valve engine for the R. & V. Knight automobile.

DePalma in Ballot

First at Los Angeles

LOS ANGELES, Feb. 28—Driving 50 miles at an average speed of 107.3 miles per hour, Ralph DePalma in a Ballot, on Beverly Hills Speedway, won the opening event of the new championship season this afternoon with Milton, second; Sarles, third, and Murphy, fourth. DePalma established a new 50 mile record for 183 cu. in. cars. Preceding the final race were four sprint matches of 25 miles each. DePalma won the first from a field of nine starters averaging 106 miles per hour; his last lap was better than 111 miles per hour, the fastest the track ever was driven.

Sarles won the second heat averaging 107 miles per hour. Murphy won the third heat averaging 102 miles per hour. Milton won the fourth averaging 104 miles an hour. Winners did not start in succeeding heats. The time was the fastest and the driving the best ever seen here. It was DePalma against the field, all but one of the other drivers using Duesenberg motored cars. The exception was Sarles in a Monroe.

TRUCKS CLEAR MARYLAND ROADS

BALTIMORE, Feb. 25—Maryland's motor fleet of twenty-five trucks equipped with snow plows, opened up every mile of road in the state, after the blizzard of Feb. 21. In the western part of the state the plows had to go through snow fifteen inches deep. The big trucks were kept on a 24-hour shift, chauffeurs working in two shifts. Farmers, dairy-men and freight trucking firms that carry on inter-city business were delighted with the work of the new snow fighters.